

**ENVIRONMENTAL ASSESSMENT FOR
WILDLAND FIRE MANAGEMENT PLAN
SENEY NATIONAL WILDLIFE REFUGE**



February 2003

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1. Purpose and Need

1.1 Purpose

Policy of the U.S. Department of the Interior states that managers of Refuge lands with vegetation capable of sustaining fire will develop a Fire Management Plan (FMP) (910 DM 1). The Fish and Wildlife Service's Fire Management Handbook (621 FW 1.4-5) states that, "Every area with burnable vegetation must have an approved Fire Management Plan." This Environmental Assessment (EA) explores the various alternatives in which Service Policy can be carried out and analyzes the foreseeable impacts associated with an integrated fire management program.

This EA has been developed to evaluate environmental consequences of the FMP being implemented for Seney National Wildlife (NWR). The FMP is one of many step-down plans that together will outline Refuge management goals and objectives. A Refuge Comprehensive Conservation Plan (CCP) is scheduled for development in the next few years. Service policy mandates that an approved FMP be in place for all burnable Refuge lands even in cases where CCP's are not yet developed.

1.2 Needs

The FMP for the Refuge has been developed to provide objectives, directions, and operational procedures that will guide all fire management activities. The FMP will guide the Refuge staff in implementing resource management objectives regarding fire until a CCP is developed. When the CCP is developed, the FMP will be updated and revised as needed. The Refuge does not have a current approved FMP. All aspects of the FMP need to be in compliance with applicable legal mandates and Fish and Wildlife (FWS) policy. The goals of the FMP and the Alternative selected in this Environmental Assessment (EA) as the proposed action are to manage wildland fire to:

1. Protect life, property, and other identified resources;
2. Use fire as a tool to accomplish resource management objectives of restoring environmental health and ecological integrity;
3. Restore and maintain fire-dependent early successional communities that existed historically;
4. Improve the status of priority wildlife species that benefit from naturally occurring wildland fire;
5. Maintain Wilderness Area standards.

The alternatives detailed in this document will accomplish these goals to varying degrees.

In the National Wildlife Refuge System Improvement Act of 1997, the Secretary of Interior was directed to "ensure that the biological integrity, diversity, and environmental health of the System are maintained for the benefit of present and future generations of Americans." The USFWS has developed a policy to comply with the act. Throughout the policy there are references to restoring degraded habitats:

“we will restore lost or severely degraded elements of integrity, diversity, environmental health at the Refuge scale,”

“we favor management that restores or mimics natural ecosystem processes or function to achieve Refuge purposes,”

“the highest measure of biological integrity, diversity, and environmental health is viewed as those intact and self-sustaining habitats and wildlife populations that existed during historic conditions.”

Historic conditions are defined as “composition, structure, and functioning of ecosystems resulting from natural processes that were present prior to substantial human related changes to the landscape.” FWS policy in complying with the Act supports and encourages the restoration of habitats to historic conditions. The full text of FWS policy on Biological Integrity, Diversity and Environmental Health can be found at www.fws.gov/r9pdm/home/newfrnotice.html.

The use of fire in restoring habitat to “historic conditions” is a basic overriding goal of the FMP. The Alternative that best achieves the “highest measure of biological integrity, diversity and environmental health” will be selected as the proposed action. The proposed action would in part move the Refuge toward the goal of historic conditions.

Historical conditions that resulted from natural processes were dynamic and frequently changed through the centuries. Drought, severe windstorms, insect and disease outbreaks, and wildfires all contributed to the ever-changing landscape. The goal will be to restore (where possible) the composition, structure, and functioning of the ecosystem resulting from natural processes. Prescribed fire will be used to mimic the effects of wildfire in restoring the landscape to historic conditions.

Restoration to historical conditions will require the development of a habitat management plan that addresses all the factors and conditions that impact current conditions. The use of fire will be but one tool in the toolbox of habitat restoration to historical conditions.

1.3 Decisions that Need to be Made

Through input of the public and staff, the Regional Director (Region 3) of the Fish and Wildlife Service must decide whether to select the preferred alternative (Proposed Action) or one of the other alternatives as presented in the EA. The Regional Director must then decide whether the selected alternative is at a significance level that requires an Environmental Impact Statement be developed or whether a Finding of No Significant Impact (FONSI) determination can be made.

1.4 Background

Seney NWR was established in 1935 by Executive Order for the protection and production of migratory birds and other wildlife. The Refuge is managed to maintain a wide array of both resident and migratory species. A variety of wetland and upland habitat types contribute to the Refuge’s biodiversity. Approximately 20 species of herptofauna, 48 species of mammals, 26 species of fish, and over 200 species of birds have been observed at the Refuge. Many of the species are Conservation Priorities for the Great Lakes Region of the FWS and several are

associated with lands that were historically maintained with periodic fire (Appendix 1).

The value of early successional fire dependant habitat within the Refuge has been recognized at both the state and national levels. Fire functions as a critical disturbance factor in the development of early successional habitats required by many wildlife species of management concern (e.g., yellow rail). The Refuge has been named a Globally Important Bird Area by the American Bird Conservancy due in large part to the yellow rail populations found in fire dependant sedge marshes.

All wildfires suppressed and limited prescribed fire use describes the actual fire management program that was in place from 1991 to 1997 at Seney. During those years the following prescribed fires were conducted:

<u>Year</u>	<u>Number of Prescribed Fires</u>	<u>Total Acres Burned</u>
1991	6	656
1992	6	631
1993	2	160
1994	4	1,266
1995	2	153
1996	1	136
1997	5	240
Average	3.7 per year	464 acres/year

The objectives of these fires varied from maintenance of open conditions in both wetland marshes and pine savannas to burns conducted to improve blueberry production for black bears and migratory birds. During those same years, there were three wildfires on the Refuge.

In 1997, a national review was conducted on all refuges that had a fire program and fire staffs. Several aspects of each refuge's program were evaluated such as wildfire causes, size and frequency, and values at risk. The result of the review was that no fire-funded positions could be justified at Seney. After several years without fire funded positions (from 1998 to 2002), a policy change occurred in 2002. Early in 2003, four fire-funded position were established at Seney that involve a prescribed fire specialist (permanent, full-time) and three seasonal (temporary, 6-month appointment) fire technicians.

However, additional personnel beyond Refuge staff will be needed in conducting prescribed burns. A funding system is now available to support cooperators from other agencies and crews from other refuges to complete approved burns. Refuge staff will develop prescribed burn plans, obtain plan approval, and arrange for any help from others to accomplish prescribed fire objectives.

All alternatives considered in this EA deal with various combinations of three fire types: human-caused wildland fires, naturally occurring wildland fires, and management-ignited prescribed

fires. The following definitions are used throughout this document.

Suppression - All the work of extinguishing or confining a fire beginning with its discovery.

Management Ignited Prescribed Fire - Fire intentionally ignited to accomplish management objectives in specific areas under prescribed conditions identified in an approved Prescribed Fire Plan.

Appropriate Management Response - The specific actions taken in response to a wildland fire, whether to implement protection and/or fire use objectives.

Confine - To confine (to a geographic area) a fire, and any spot fires therefrom, with the use of existing barriers (e.g., roads, pools, etc.), which can reasonably be expected to check the fire's spread within a predetermined area under prevailing and predicted conditions.

Contain - To restrict a wildland fire to a defined area using a combination of natural and constructed barriers that will stop the spread of the fire under the prevailing and forecasted weather conditions until it is out.

Control - To aggressively fight a wildland fire through the skillful use of personnel, equipment, and aircraft to establish fire lines around a fire, halt the fire's spread, and extinguish all hot spots until the fire is completely out. This strategy is an effective technique to achieve prompt control of a wildland fire.

Wildland Fire Use - a planning and assessment process that can permit natural ignited fires to burn, under limitations and in a controllable manner, to accomplish natural resource benefits.

Minimum Impact Suppression Tactics (MIST) - a suppression response process in which the least impact to the land is of primary concern.

Minimum Tool Analysis - a process to effectively analyze proposed actions to minimize negative impacts to wilderness character and values.

The pattern of fire effects varies in its frequency, season, size, immediate effects, and intensity with these long-term patterns described as fire regimes:

Understory fire regime - fires that do not kill the overstory vegetation or change the composition of the dominant vegetation.

Stand-replacement regime - fires that kill above ground vegetation and therefore changes the dominant vegetation structure.

Mixed-severity regime - fires that fall between Understory and Stand-replacement and cause selective mortality of vegetation depending on how susceptible vegetation is to fire.

2. Alternatives

2.1 Alternatives not Considered for Detailed Analysis

The option of permitting lightning ignited wildfires to burn in the Refuge Wilderness and roadless areas regardless of environmental conditions is not considered an acceptable alternative. Under extreme wildfire conditions, such an alternative would pose a serious threat to life and property off Refuge.

Fuel breaks necessary to stop an extreme wildfire advance are not practical for most of the boundary in question. Natural wildfires historically have been the most extensive and intense during periods of drought and elevated burning conditions under a natural regime. Most lightning ignited fires are extinguished with the accompanying rain of the storm, especially on upland mineral soils. On wet organic soils the same short live ignition is often the result of a lightning strike. During drought, lightning strikes are much more likely to ignite drought-dried soils. Once organic soils begin to burn, rainfall is often not sufficient to extinguish the smoldering soil. The smoldering fire remains small and in the soil until environmental conditions are such that it becomes a surface fire. Advancing surface fires generally burn larger areas with more intensity during droughts and start more ground fires that provide additional sources of ignition. With a return of rainfall, surface fires may be extinguished but extensive ground fire in many areas would continue to smolder until more favorable fire supporting conditions returned. If and when elevated burning conditions return, firefighters could face many ignition sources over a large area that could make control extremely difficult.

A wildfire ignited by lightning during the drought year of 1976 resulted in an extensive area burned. Some of this area was burned under intense conditions. Hundreds of ground fires burning provided sources for re-ignition and were the cause of several areas burning more than once. Despite a firebreak along Highway M-28 and burnout actions to stop the fire moving north, the fire spotted over the Highway and burned north for several more miles off the Refuge.

During drought and under other conditions that create intense fire behavior, wildfires cannot be contained with only firebreaks at the boundaries of the Wilderness Area or roadless areas. Because of this lack of ultimate control, permitting fires to burn regardless of environmental conditions, is not an alternative that will be considered for detailed analysis.

2.2 Alternatives Carried Forward for Detailed Analysis

2.2.1 Alternative A: No Action - Suppression and No Prescribed Fire Use

Current FWS policy requires suppression of all wildland fires and prohibits prescribed fires for all refuges without an approved FMP. Under this alternative, all natural and human caused ignitions would be suppressed and no prescribed fires would be conducted. This alternative accurately reflects a “no action” or “no change” in Refuge fire management since the last

prescribed burns were conducted in 1997. All wildfires have been suppressed and no prescribed burns have been conducted in the last five years.

Fire breaks along Pine Creek, Driggs River, and Marsh Creek Roads would be maintained by mowing roadsides and grading road surfaces. Other fire breaks along the Refuge boundary protecting the communities of Seney and Germfask would also be maintained. There would be no hazardous fuel reductions or any other mechanical manipulation of vegetation to reduce wildfire hazards under this alternative.

Wildfire suppression actions within the Wilderness Area would require a Minimum Tool Analysis prior to any activity. Suppression options of containing or confining a fire may be more appropriate than direct control in attempts to suppress a fire in the Wilderness Area. However, drought conditions, the potential for extensive ground fire, and other factors need to be evaluated in choosing the appropriate management response.

Options to consider in Wilderness suppression activities that may minimize long-term impacts include:

1. The use of a Minimum Tool Analysis.
2. The use of MIST (Minimum Impact Suppression Techniques).
3. Aerial suppression of wildfire, where possible.
4. The use of wet lines instead of plowed control lines.
5. Sprinkler use to establish control lines.
6. Indirect attack, where possible, using a contain or confine suppression strategy.
7. Any other techniques that would uniquely apply to a given wildfire in the Wilderness Area.

Under the No Action Alternative the use of prescribed fire would not be used as a management tool.

Restoration of hydrology involving Marsh and Walsh Creeks and plugging of the Walsh Ditch is included in this Alternative. In 2001, an Environmental Assessment was completed on the Marsh and Walsh Creek Restoration Project. The project is currently under way and will restore water to thousands of acres of wetlands along the Walsh Ditch. The restoration of water to wetlands along the Walsh Ditch will reduce potential damage from wildfires to organic soils affected by the drainage ditch.

2.2.2 Alternative B: Suppression and Prescribed Fire

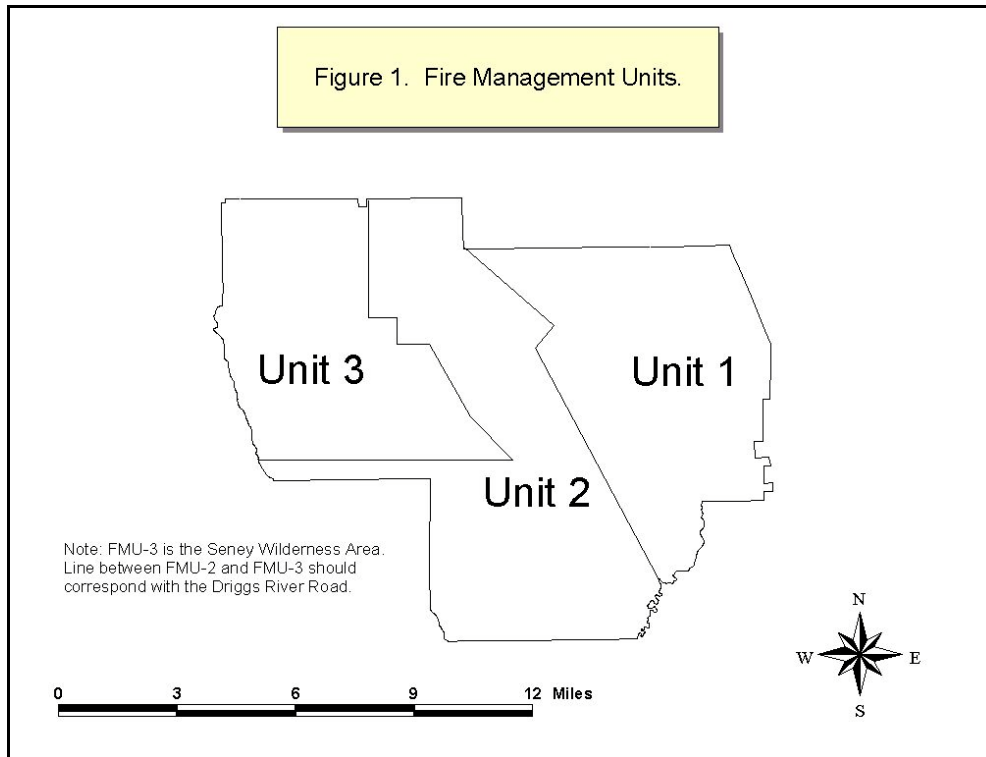
This Alternative includes the same suppression strategy as Alternative A (all wildfires suppressed) with the addition of limited prescribed fire use. Management ignited prescribed fires would be used to mimic natural fire processes and reduce fuel hazards.

Wildfire is a natural disturbance mechanism and is considered a natural driving force in the vegetation communities found over approximately 90% of the Refuge. Objectives for prescribed fire in priority order include:

1. Reduction of woody plant (e.g., tag alder, bog birch, willow) succession or invasion into sedge marsh habitat on up to 6,000 acres.
2. Reduction of wildfire fuel hazards and the regeneration of jack pine and aspen on up to 2,000 acres. Many of these stands are mature to over-mature and are dying out. Fire would regenerate both the aspen and jack pine and maintain these cover types on the landscape.
3. Maintenance of upland grasslands and red pine savanna systems on up to 2,000 acres.
4. Restoration and maintenance of up to 2,000 acres of red and white pine stands that have been invaded by jack pine and aspen or are open areas of primarily lichens and charred stump fields due to human caused cutting and fires in the early 1900's. Many Refuge jack pine and aspen stands are growing in extensive areas of red and white pine stump relics. The old stumps were preserved by fire and still stand as a testament to historical conditions. Along the Driggs River and Pine Creek, many stump field areas still persist even though 100 years has past since logging and intense slash fires. Frequent prescribed fire can be used to kill jack pine and to eliminate the resulting reproduction. Planting of red or white pine, if necessary, would then move many sites closer to historic conditions.
5. Maintenance of dikes and adjacent wetland habitats by keeping these areas free of woody plants and invasive exotic species. Trees and woody shrubs weaken pool dikes by creating channels for the passage of water. Dikes are frequently invaded by invasive plants such as glossy buckthorn, and once established they become sources of infestation for adjacent wetlands. Fire when used in combination with mowing can be effective in controlling woody and invasive plants on dikes and in adjacent wetlands involving up to 1,000 acres.

2.2.3 Alternative C (The Proposed Action): Fire Use and Prescribed Fire in Habitat Restoration

This Alternative provides for differing strategies for each of three Fire Management Units in terms of suppression and prescribed fire use (Fig. 1).



In Unit 1, all wildfires will be suppressed using the appropriate management response (MIST, Fig. 2). Prescribed fire will be utilized on all burnable acres in both Unit 1 and Unit 2 (62,578 acres combined) with the intent to replace the effects on flora and fauna from naturally occurring fires (Fig. 3). In Unit 2 and Unit 3, a Wildand Fire Use Policy will apply that may permit some naturally ignited fires to burn to accomplish resource objectives (Fig. 4).

Figure 2. Fire Management Unit 1.

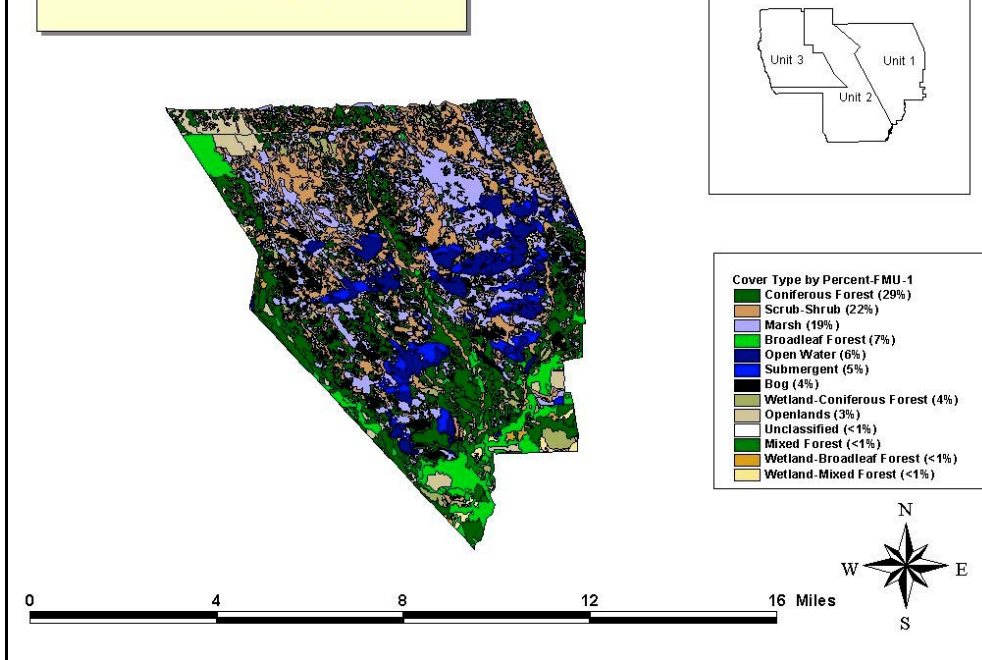
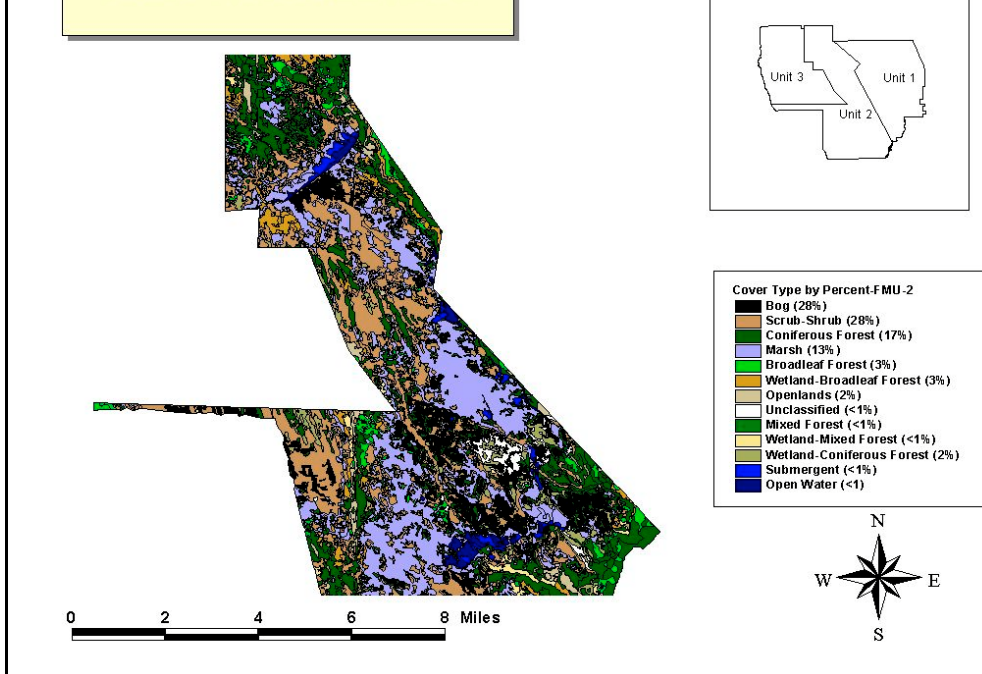
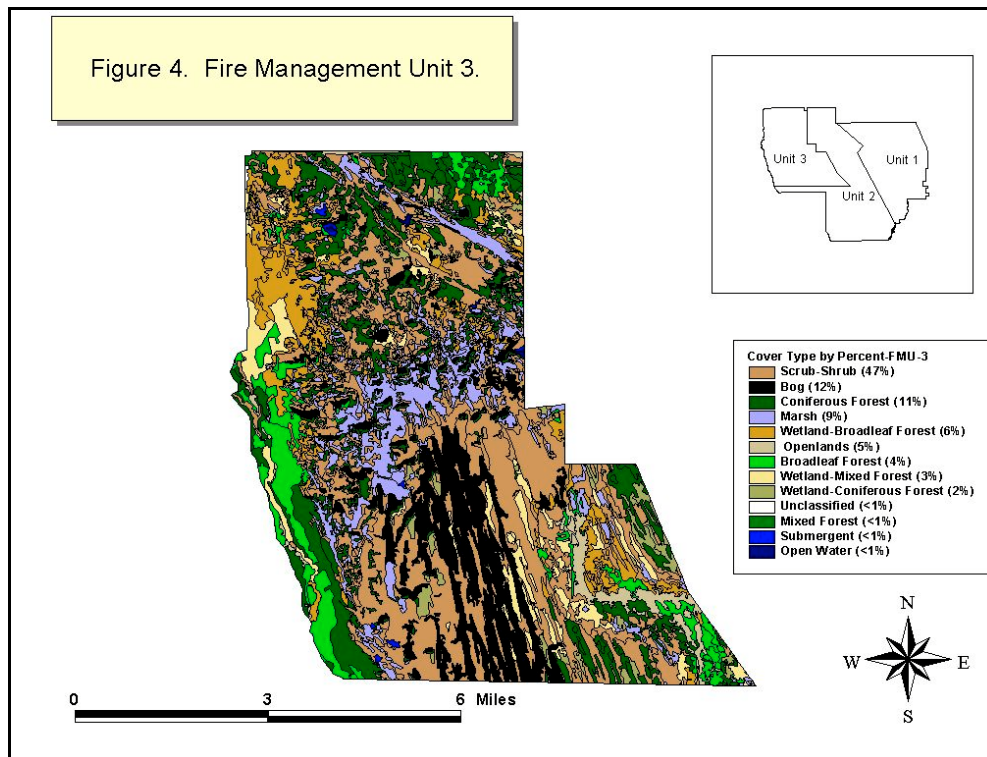


Figure 3. Fire Mangement Unit 2.





Unit 1

Wildfire

All human ignited and natural ignitions in this 33,657-acre Unit will be suppressed using the appropriate management response (MIST). The Unit contains the vast majority of Refuge roads, pools, ditches, and other developments. Given the existing barriers that could stop a fire's spread and good access to most areas, the appropriate management response to a given wildfire could involve any of the three basic strategies of confine, contain or control.

Prescribed Fire Goals

The goal of the application of prescribed fire in both Unit 1 (involving 27,600 acres) and Unit 2 (involving 34,978 acres) is to mimic the ecological role of naturally occurring fire on the landscape. To accurately mimic the effects of natural fire by conducting effective burns will require a complex process and involve considerable planning and resources. Fires will need to be conducted that vary in their patterns and fire regimes. Fire regimes varied historically in their frequencies, sizes, immediate effects, and intensity. Natural fires often occurred during late summer and early fall lightning storms. Some fires burned during extreme drought and others during wet periods. Each year, annual burn plans should be planned and evaluated based on their effectiveness in restoring the effects of natural fire to the landscape. It will take many years and considerable resources to reach the goal of fire restoration to Seney's landscape.

Prescribed Fire Use

A total of 27,600 acres of Unit 1 (out of 33,657 acres) is fire adapted and is proposed for prescribed fire treatments. The only areas excluded from fire treatments are open water (2,019 acres), submerged plants (1,683 acres), and broadleaf forest (2,356 acres) commonly referred to as northern hardwoods). A total of 27,600 acres in Unit 1 to receive periodic fire treatments are listed in Table 1 by cover type and fire regime.

Table 1. Cover types and associated fire regimes (Unit 1).

Cover Type and Acres	Understory	Stand-Replacement	Mixed Severity
Upland coniferous forest (9,761) ^a	X	X	X
Scrub-shrub (7,405)		X	
Marsh (6,395)		X	
Bog (1,346)		X	
Wetland coniferous forest (1,346) ^b			X
Openlands (1,010)		X	
Other (337)		X	

a = Jack pine (stand-replacement) and red and white pine (understory and mixed severity regimes). b = Spruce/fir/cedar (stand replacement or understory).

Assuming a general fire return interval of between 20 to 30 years for all cover types, annual fire treatments for the Unit should average between 920 to 1,380 acres per year (mean overall average of 1,150 per year). Unit 1 was outside the perimeter of the 1976 wildfire and zero acres burned east of the Driggs River. There are no records of any wildfires in the Unit since the Refuge was established in 1935. Due to suppression of all wildfires for at least the past 68 years and the resulting fuel buildup, fire treatments in some vegetation types may need to be initially less intense and more frequent. Differences in precipitation and weather patterns each summer may require adjustments to annual unit goals. During dryer and warmer summers, annual fire goals may be exceeded to make up for wet cool years when little burning can be accomplished. Wetland burns will be more likely during the driest years with upland drier sites favored during wetter years. On average, over the long term, approximately 1,150 acres (920 and 1380 divided by 2) should be treated with fire annually in Unit 1.

Unit 2

Wildfire

Responses to wildfires in this Unit, west of the Driggs River and outside the Wilderness Area, will be one of either Wildland Fire Use or an appropriate management response directed toward suppression. Unit 2 is basically roadless wetlands interspersed with sand islands. Along the Driggs and Manistique Rivers and Walsh Creek a variety of pines, aspen, white spruce, and paper birch can be found. Much of the Unit is very similar to the adjacent Wilderness area to the west.

In Unit 2, all human-caused fires will be suppressed. Lightning-ignited fires will be evaluated to determine if environmental conditions are within predetermined management parameters and if adequate fire management personnel and equipment are available to permit the fire to accomplish resource objectives. With a natural ignition, a Wildland Fire Use Plan may be initiated per the Fire Management Plan in a progressive manner by three stages.

In Stage I - the fire situation is evaluated and decisions are made as to whether the fire should be suppressed or managed for resource benefits.

Stage II - this stage is used to gather additional information for developing implementation actions. Predictions of where the fire may go, how intense it may burn, how fast it may spread, what the necessary short-term management actions are, how complex the fire is and if long-term actions (Stage III) need to be addressed immediately. A decision is made at this point to manage the fire for resource objectives.

Stage III - provides the long-term actions necessary to manage the fire to accomplish identified resource management objectives.

A detailed description of the Wildland Fire Use Planning process can be found in the Fire Management Plan or in the Fish and Wildlife Service's Fire Handbook at:
<http://fire.r9.fws.gov/fm/policy/HANDBOOK/Default.htm>

Prescribed Fire Use

A total of 34,978 acres of Unit 2 (out of 36,068) are fire-adapted and are proposed for prescribed fire treatments. The only areas excluded from fire treatments are open water (363 acres) and broadleaf forest (i.e., northern hardwoods, 1090 acres). A total of 34,978 acres in Unit 2 to receive periodic fire treatments are listed in Table 2 by cover type and fire regime.

Table 2. Cover types and associated fire regimes (Unit 2).

Cover Type and Acres	Understory	Stand-Replacement	Mixed Severity
Bog (10,175)		X	
Scrub-shrub (10,175)		X	
Upland coniferous forest (6,178) ^a	X	X	X
Marsh (4,724)		X	
Wetland Broadleaf Forest (1,090)			X
Wetland coniferous forest (726) ^b		X	
Openlands (727)		X	
Other 1,118			

a = Jack pine (stand-replacement) and red and white pine (understory and mixed severity regimes). b = Spruce/fir/cedar (stand replacement or understory).

Assuming a general fire return interval of between 20 to 30 years for all cover types, annual fire treatments for the Unit should average between 1,166 to 1,749 acres per year (or a mean annual increment of 1,458 acres per year). Differences in precipitation and weather patterns each year

may require adjustments to annual Unit goals with some year accomplishments exceeding goals and in other years falling short.

Unit 3 (Wilderness Area)

Wildfire

When ignitions in the Wilderness require a suppression response, a Minimum Tool Analysis will be completed prior to any action or activity. Minimum Impact Suppression Techniques will always apply. Aerial suppression, the use of wet lines and sprinklers, and indirect attack all contribute to keeping impacts to a minimum.

The Wilderness Act provides for Wilderness wildfire control in Section 4(d) “In addition, such measures may be taken as may be necessary in the control of fire, insects and diseases, subject to such conditions as the Secretary deems desirable.” Section 4c also provides for the possible use of motorized equipment in Wilderness- “measure required in emergencies involving the health and safety of persons within the area: are considered a minimum requirement for administration of the area. Firefighters engaged in suppression activities in the Wilderness are at risk and need emergency escape routes. The use of motorized equipment such as helicopters or low-ground pressure vehicles may be needed. Water pumps and sprinklers may be necessary in establishing safety zones and control lines. The Incident Commander (IC) of the fire will have the responsibility to assure that only the minimum actions necessary to get the job done are use. The Refuge Manager and staff will be responsible to advise and consult with the IC to assure that he/she is taking only the minimum action necessary.

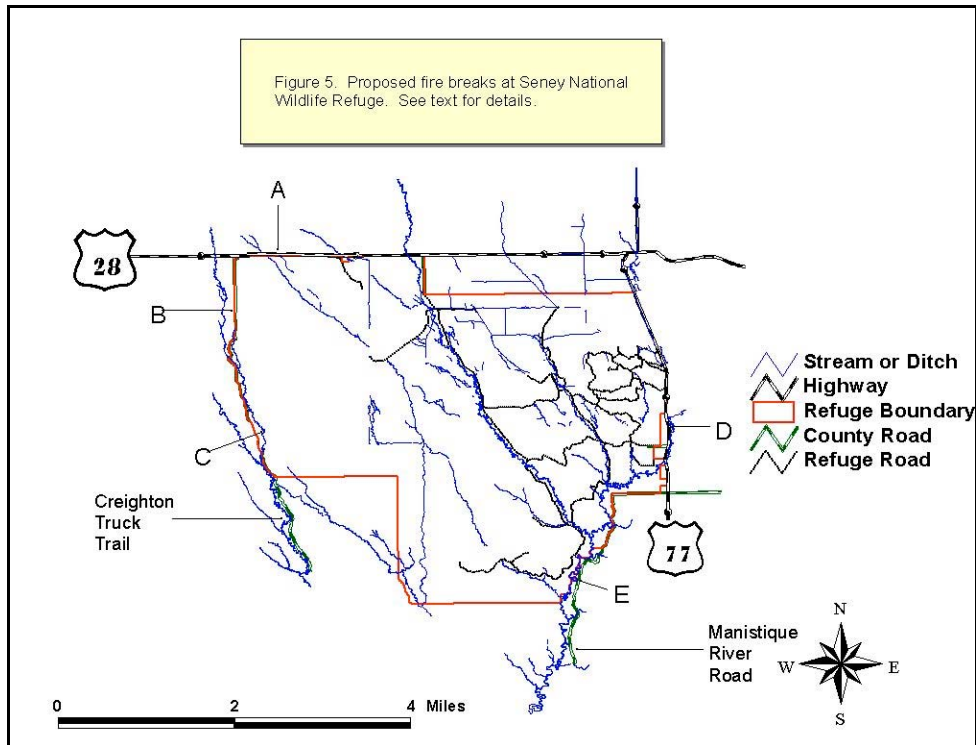
Response to wildfire in the Wilderness Area will either be directed toward suppression or will be managed for resource benefits. All human-caused ignitions will be suppressed. Lightning ignitions will be evaluated utilizing a process described in this Alternative in the Unit 2 Wildfire section. The three-step evaluation process will determine whether a given fire start will be suppressed or managed for resource benefits.

Prescribed Fire

There will be no prescribed fire in the Wilderness Area for natural resource benefits. Over the next several years, techniques and staff experience should be developed in applying fire to roadless areas with minimal impacts. Once the needed techniques and experience is developed, the use of prescribed fire in the Wilderness Area can be considered. At that time, the Refuge Fire Management Plan needs to be revised with an appropriate Environmental Assessment completed.

Fuels/Fire Break Management

In order to enhance the effectiveness of stopping a fire at the Refuge perimeter, fuel hazard reduction projects and the establishment of fuel breaks are proposed (Fig. 5).



Fuel management projects are:

North Boundary

Highway M-28/Railroad - along the north boundary of Unit 2 and Unit 3 between the Driggs River road and the Creighton Truck Trail, a fuel break will be created between the highway and railroad tracks. Land ownership along the seven-mile, 130-foot wide strip is a combination of SBCAmeritech, the Refuge and a Michigan Department of Transportation road right-of-way. All trees within the strip will be removed with the area either mowed or burned to maintain the area tree free. Approximately $\frac{1}{2}$ of the strip is currently occupied by trees that make the strip a less effective barrier to a fire's advance. Once cleared of trees, the strip will provide an approximately 200-foot wide fuel break that should be effective in stopping most fires from advancing from the Refuge to the south. Fuels on the Refuge and south of the strip are a mixture of lowland conifers, aspen, scrub-shrub, and sedge marshes with scattered ridges of jack and red pine.

Northwest Boundary

A four-mile fuel break will be created along the Creighton Truck Trail from the Highway M-28 intersection south to the first Creighton River bridge. On the Refuge, or east side of the road, all trees will be removed between the road edge and the posted boundary that is approximately 30 feet wide. A majority of the strip is currently free of trees. On the Michigan Department of Natural Resources' side, or west side of the road, all trees within 15 feet of the road edge will be cleared. Both sides of the road will be kept tree free with periodic mowing. The fuel break width including the roadbed (20 feet) will be 65 feet wide. Fuels adjacent to the east and west are primarily an aspen/spruce mixture that is not expected to generate intense fire behavior.

Southwest Boundary

The southwest Refuge boundary along the Creighton Truck Trail from four miles south of Highway M-28 to the intersection with the Highwater Truck Trail is considered highly fire resistant due to the presence of northern hardwoods. There is no need for any improvement to the natural firebreak that exists along the Creighton River.

South Boundary

Along the south boundary, adjacent Department of Natural Resources lands consist of a series of large jack pine clearcuts that provide effective fuel breaks. Most clearcuts are under 10 years of age and will not develop fuel hazards for several more years. Fuel hazard reduction projects in the area would provide no additional benefits in stopping a fire from moving from the Refuge towards the south.

Southeast Boundary

Along the southeast boundary of Unit 1, a fuel reduction project involving pine restoration will improve fire control effectiveness. The area along the Manistique River is comprised of a diverse mix of wetland and upland vegetation communities. Marsh Creek Road runs parallel to and about ½ mile west of the River within the Refuge. Approximately 15 to 20 private homes and seasonal cabins are located within a few miles to the south and southwest of the road and could potentially be threatened by a fire advancing from the Refuge toward the south-southwest.

Management actions will promote red and white pine and reduce understory jack pine. Restoration of historic red and white pine stands and red pine savannas will reduce wildfire fuel hazards south of and adjacent to the road. Hazard reduction actions will take place in approximately 100 acres along the three-mile section of Marsh Creek Road.

The Refuge will provide funding support to the Schoolcraft County emergency response organization to identify and map residences and cabins on private land south and southwest of the Refuge along the Manistique River.

Germfask

In Unit 1, directly west of and adjacent to the community of Germfask, dense and mature jack pine and black spruce pose a threat to the town. There is the potential for a stand replacement fire advancing from the northwest into the west side of town. In order to prevent such an occurrence, a fuel hazard reduction project is proposed for the jack pine and spruce stands along the boundary. Various thinning treatments will be made to lower stem densities per acre and eliminate potential crown fires from developing. Wherever scattered dominant white pines are present, white pine regeneration will be encouraged. White pine does not generally generate the fuel buildup necessary for crown fires. The thinned stand may be treated with periodic light intensity, under-burning to prevent regeneration of jack pine and spruce. Such a treatment is recognized as being not ecologically based on natural processes, but is proposed to assure the safety of Germfask. The total area to be treated adjacent to town is estimated at 40 acres.

2.2.4 Summary Table of Management Actions by Alternative

Actions	Alternative A (No Action)	Alternative B (Suppression, etc.)	Alternative C (Fire Use, etc.)
Wildfire Suppression	All fires suppressed Units 1, 2, 3	All fires suppressed Units 1,2,3	All Fires Suppressed Unit 1
Wildland Fire Use	None	None	Unit 2 - 34, 978 acres Unit 3 - 25,100 acres Total 60,078 acres
Prescribed Fire Use	None	13,000 acres	Unit 1 - 27,600 acres Unit 2 - 34,978 acres Unit 3 - 0 Total 62,578 acres
Fuel/Fire Break Management	None	None	Units 2 & 3 North - 7 miles Northwest - 4 miles Unit 1 Southeast 3 miles Germfask - 40 acres

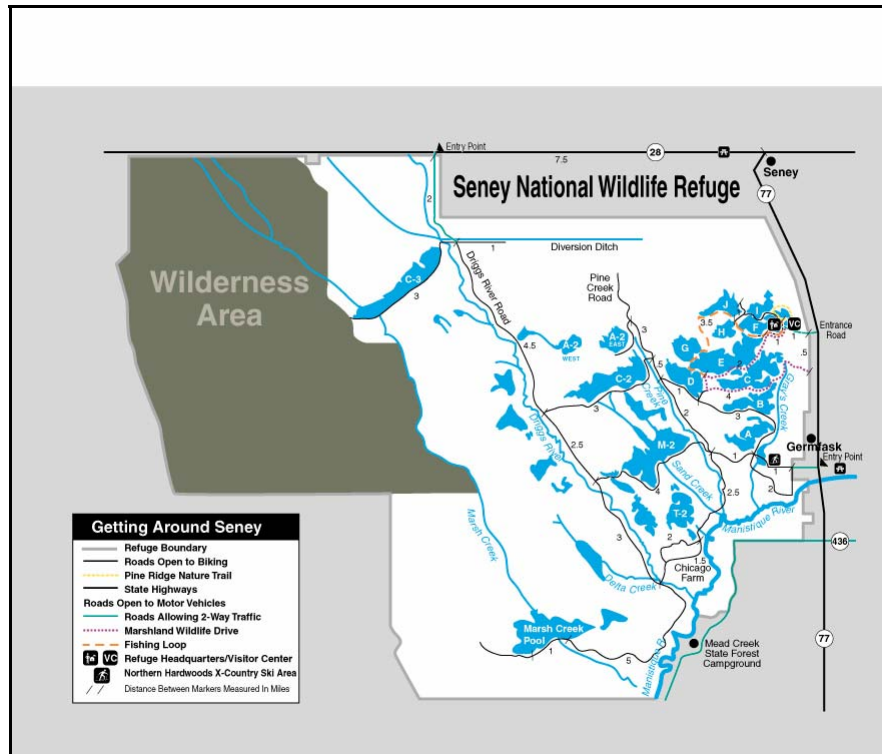
3. Affected Environment

3.1 Physical Characteristics

Location

Seney NWR is located in the east-central portion of Michigan's Upper Peninsula equidistant from Lake Superior and Lake Michigan. The Refuge encompasses approximately 95,238 acres; the Seney Wilderness Area and Strangmoor Bog National Natural Landmark encompass 25,150 acres or 26 percent of the Refuge. Located in northeastern Schoolcraft County, the refuge is removed from major population centers; the three nearest major communities are each more than 80 miles away (**Fig. 6**).

Figure 6. Seney National Wildlife Refuge.



History

Before its establishment, the forests and soils of the Seney area and surrounding Schoolcraft County were exploited to a considerable degree starting in the late 1800's. Early timber cutting favored the best stands of white pine, followed by "high-grading" in the red pine and hardwood-hemlock stands. Slash fires fueled by logging debris occurred annually with most areas burning time and time again. As sawtimber diminished, efforts were shifted to cutting of poles, posts, ties and pulp. At this time, an attempt was made to settle cutover lands and develop farming communities.

By 1912, drainage of the Seney Swamp was underway. Imperfect drainage of peat soils, poor soil fertility, and the short growing season made the farming venture a disaster and most lands were tax-reverted to the State of Michigan by the early 1930's. Seney NWR was then established in 1935 by Executive Order under the Migratory Bird Conservation Act for the protection and production of migratory birds and other wildlife. The Refuge now receives nearly 100,000 visits from the public each year and a variety of wildlife-oriented activities and programs are available.

Climate

The climate of Seney NWR is considerably lacustrine influenced by its close proximity to Lakes Superior and Michigan. The most common spring through early fall winds are from the southwest and northwest and average approximately 10 m.p.h. Average humidity during spring and fall varies from 50 to 60 percent. Temperature extremes are approximately -35 degrees Fahrenheit and 98 degrees Fahrenheit. Precipitation occurs throughout the year, with June being the wettest month and March the driest on average. Average annual precipitation is approximately 27 inches

and average annual snowfall is approximately 123 inches. During spring and summer months, on-shore breezes cause frequent afternoon thunderstorms. Lightning strikes are common during such storms, probably due to the relative lack of topography in the area. Growing season evaporation averages 25.1 inches. It is expected that only during 5 percent of the time will drought indices (e.g., Keetch-Byram Drought Index) reach extreme severity levels. The growing season averages 119 days.

Topography and Geology

According to the regional landscape classification system of Albert (1995), Seney NWR lies within the Seney Sand Lake Plain. This unit is characterized by landforms of lacustrine origin with broad, poorly drained embayments containing beach ridges, swales, dunes, and sandbars.

The lands comprising Seney NWR present an area of seemingly little geological variation in comparison with more scenic areas along the shores of Lake Superior and Lake Michigan. Although relatively little topographic relief exists on the Refuge (elevation varies from approximately 803 feet in the northwest to 640 feet in the southeast), the broad flat lands of the Refuge reflect a subtle, but highly complex, geologic history. Between 10,000 and 10,500 years ago, the "Valders" pro-glacial lakes in the Superior basin drained southward across the Upper Peninsula. At about the latter date, the Valders ice border was located along the southern shore of Lake Superior allowing meltwater to drain southward across what is now the Refuge. During this period of time, the present land surface appears to have been sculptured. At least two phases of drainage seem to be visible in the surface patterns of the area. The first of these is a broad channel eroded into earlier outwash deposits that carried meltwaters from the area of Long Lake southward through what is now termed the "Strangmoor Bog." Throughout the length of this channel now occur linear landforms composed of sandy sediments.

A second generation of outwash channels is visible as linear peat-filled depressions trending northwest-southeast across Seney NWR. These landforms are now considered to be a unique patterned bog topography and are prominently visible near Creighton and in the Refuge lands east of the Driggs River (Seney Wilderness Area). Finally, the present natural drainage patterns present a still different orientation and one that transects the above peat-filled channels. In the Seney area, the Driggs River best exhibits this pattern.

Since 10,500 years ago, the Seney area has been a site for marsh development. At present, from 3 to 9 feet of peat blanket the area. Among the more conspicuous landforms in the area are parabolic sand dunes, which have spread from northwest to southeast across the Refuge in a disjointed pattern. These landforms indicate arid conditions in the area, which allowed for the disruption of vegetation developed upon the surrounding sand and gravel deposits. At the same time, prevailing northwest winds winnowed the exposed fine to medium grained sands from the earlier outwash sediments and gave rise to the present dune topography.

Soils

Within the Seney Sand Lake Plain, 100 to 200 feet of glacial drift generally cover the bedrock. The soils on the Refuge are generally level to somewhat sloping mucks, peats, and sands. The dominant mucks are interspersed with sand ridges and knolls in such an intricate pattern that the two soils have been mapped together as a complex of Carbondale muck and Rubicon sand (dune

phase). The muck has accumulated on the wet sandy plain at a depth of 3 to 9 feet. The material is a dark brown, spongy, felt-like muck, which is more decomposed than peat soils and in general contains a higher percentage of mineral matter. The natural drainage is very poor in the mucks and excessive in the sands on the ridges and knolls. This complex covers the majority of the Refuge.

A large area of Dawson and Greenwood peats exists in the central portion of the Refuge. These level, very poorly drained soils are composed of brown or yellow-brown mixed fibrous and woody material. Very little decomposition has taken place in these soils in comparison to the muck soils. At depth of 1 to 2 feet, raw yellow peat or muck underlies the peat. Very little decomposition has taken place in the areas of yellow peat. The water table is at the surface most of the year. The peat soils on the Refuge are interrupted by areas of Carbondale and Tawas mucks. Wet sands underlie the entire area.

Along the Manistique River Valley, Driggs River, and the other tributaries draining the Refuge, the soils are predominately sands and sandy loams. These soils are well or excessively drained and lie on slopes that are level to steeply sloping. The soil surface consists of forest litter, underlain by gray sandy loam or fine sandy loam, with coarser sand beneath the loam.

Under the former Soil Conservation Service Capability Class system, most of the Refuge would be Class V, wet soils. The wet sandy areas are Class II, VI, and VIII, while the better drained areas are Class II and III. Only small areas along the Manistique River and along the western border of the Refuge are suitable for farming.

Water

The major trend has been for streams to cross the Seney area at a north-south to northwest-southeast trajectory and to join the northeast-southwest trending Manistique River. This stream channels runoff into Lake Michigan at the town of Manistique. The Manistique River valley, for example, marks an approximate geologic boundary between eroded lowlands of the Seney Marsh and the uplands of earlier glacial outwash deposits to the east. Meltwater from the Valdres ice front apparently channeled water into the pre-existing Manistique River, allowing for the erosion of earlier outwash deposits in the Seney area and the removal of these sediments through the Manistique River.

Twenty-one man made pools have been constructed on the Seney NWR and they impound nearly 6,500 acres of open water. These pools were created by an intricate dike system that catches water as it flows through the Refuge. Because the general topography of the Refuge is flat with a natural drainage to the southeast, water flows from one pool to another without the aid of pumping stations. The principle source of water for these pools is several streams and ditches that flow into the Refuge from the north.

Water levels within the pools can be regulated to accomplish certain objectives. The water level of each pool is controlled independently of the others by regulating the water control structure. When waterfowl are nesting, water levels are kept high to discourage nest predation.

Air

The Seney Wilderness was designated as a Class I Area in 1977 by the Federal Clean Air Act giving the area special protection from air pollution impacts. The Refuge has the responsibility to protect air quality related values in the area from adverse impacts from human-caused air pollution. Air quality related values include flora, fauna, soil, water, visibility, odor and cultural and archeological resources. Despite this protection, the Service has documented impacts to Refuge resources from air pollution, primarily from sources outside the refuge. For example, Refuge surveys conducted from 1999-2001 found injury to vegetation from ozone pollution formed from industry, power plant, and auto emissions. Power plants and other sources also release mercury, which bioaccumulates in fish and wildlife at the Refuge. In addition, visibility at the Refuge is often impaired by fine particulate pollution. A review of air quality issues pertaining to the Refuge can be found in the Air Quality Briefing, Seney NWR (2001).

The Clean Air Act, as amended, requires the Refuge to comply with all Federal, state, and local air quality standards and regulations to the same degree as any non-Federal entity. These standards and regulations impact how the Refuge manages fire. The primary combustion products emitted by wildland fires include carbon dioxide, water vapor, carbon monoxide, particulate matter, hydrocarbons, and nitrogen oxides. Some of these combustion products are considered to be air pollutants and can adversely affect human health and air quality related values. For example, small particulate matter can impact visibility by scattering and absorbing light, affecting how far and how well we can see. However, wildland fires are infrequent and relatively short in duration and, as a result, their impact to visibility is also limited to short periods of time. In addition, the Refuge uses smoke management techniques, such as scheduling prescribed fires during those periods when fuel and meteorological conditions will minimize air quality impacts.

Monitoring by the nationwide IMPROVE (Interagency Monitoring of Protected Visual Environments) network has shown that, in general, most visibility impairment at Class I areas is caused by sources outside the Class I areas, including power plants, industry, and autos. In 1999, the Refuge joined the IMPROVE network and is now collecting information to determine the causes of visibility impairment at Seney. In addition, an automatic camera continuously records visibility conditions at the Refuge, which are updated every 15 minutes at www.mwhazecam.net. Real-time particle measurements from the Refuge are also available at the website.

The Service is working with States, Tribes, and the Environmental Protection Agency (EPA) and others to protect and improve visibility in Seney and other Class I areas. This effort is a result of the EPA's 1999 regional haze regulations, which require States to develop plans to make progress towards the national visibility goal of preventing any future impairments and remedying any existing visibility impairment due to human-caused pollution in Class I area. The Service, States, Tribes, and EA recognized that fire is a natural part of the ecosystem. As such, it is likely that emissions from wildfire and some prescribed fire will be considered as part of the natural visibility background. The Service along with States, Tribes, EPA and others are participating in regional planning and analysis which will likely result in emissions controls programs to protect and improve visibility in Class I areas throughout the country.

3.2 Biological Resources

3.2.1 Habitat and Vegetation

Pre-European forests consisted of large tracts of sugar maple (*Acer saccharum*), American beech (*Fagus grandifolia*), eastern hemlock (*Tsuga canadensis*), yellow birch, (*Betula alleghaniensis*), and red and white pine (*Pinus resinosa* and *Pinus strobus*). Fire, which periodically altered this association, allowed successional species, particularly jack pine (*Pinus banksiana*), paper birch (*Betula papyrifera*), and aspen (*Populus* spp.) to become abundant. Swamp forests were dominated by black spruce (*Picea mariana*) and balsam fir (*Abies balsamea*) and tamarack (*Larix laricina*).

During the late 19th century the pine forests (and to a lesser extent, the hardwood stands) were heavily logged. The swamp conifers, on the other hand, were logged only to a limited extent as access to this resource was difficult. Early logging was usually associated with uncontrolled fires that burned much of the soil humus needed for rapid forest regeneration. As a result, much of the forest re-growth and maturation (i.e., closing of forest openings) has occurred only in recent years. Large areas of present vegetation consist of the aspen-birch and white-red-jack pine types.

Due to many parameters, the present condition of the second growth forest is quite variable. On good upland sites there is an abundance of sugar maple, beech and yellow birch. Swamp forests and shrub-scrub, however, presently cover large areas of wilderness. Refuge visitors only infrequently use these areas. A brief discussion of major community types is given below, see Table 3 for major cover types.

Table 3. Approximate acreage of major cover types of Seney National Wildlife Refuge as derived from interpreted 1992 National Aerial Photography Program (NAAP) airphotos. Although desired minimum resolution is approximately 2 acres, considerable ground-truthing is necessary to enhance quality and to reduce classification error. Due to the need to lump and/or split categories, these cover types differ from the community types discussed below.

Cover Type	Approximate Acreage	Percent
Shrub-Scrub	24,755	26
Coniferous Forest	22,851	24
Marsh	17,138	18
Bog	7,616	8
Broadleaf Forest	5,713	6
Wetland Broadleaf Forest	3,808	4
Wetland-Coniferous Forest	2,856	3
Openlands	2,856	3
Open Water	2,856	3
Submergent	1,904	2
Wetland Mixed Forest	1,904	2
Mixed Forest	478	<1
Unclassified	503	<1
Total	95,238	100

The white, red, and jack pines are major constituents of the coniferous forest community. Associated species vary but would include primarily aspen, red maple (*Acer rubrum*), and others. Understory species include wild raisin (*Viburnum cassinoides*), bracken fern (*Pteridium aquilinum*), hazels (*Corylus* spp.), wild strawberry (*Fragaria virginiana*), princess pine (*Lycopodium* spp.), blueberry (*Vaccinium* spp.), and huckleberry (*Gaylussacia baccata*). Lichens, grasses and sedges are also represented, especially in the second growth aspen stands. White pine was a dominant forest component in the Seney area before logging and burning converted thousands of acres to second growth aspen and jack pine. This forest type still exists, but is scattered throughout Seney NWR.

The upland hardwood forest community is commonly referred to as the broadleaf forest, northern mesic, northern hardwood, or hardwood-hemlock forest, and is comprised of sugar maple, American beech, and yellow birch, with eastern hemlock as an important associate. Other associates include American basswood (*Tilia americana*), black cherry (*Prunus serotina*), paper birch, white spruce (*Picea glauca*), and balsam fir. When the tree canopy closes in, the herbaceous plants disappear. However, in suitable areas, several shrubs (e.g., Canada Yew (*Taxus canadensis*), elderberry (*Sambucus* spp.), leatherwood (*Dirca palustris*) and hazel) and other plants (e.g., partridge berry (*Mitchella repens*), bunchberry (*Cornus canadensis*), twinflower (*Linnaea borealis*), baneberry (*Actaea* spp.), trillium (*Trillium* spp.)) could occur. This forest type is located in the southwest section of the Refuge.

The lowland conifer forest community represents a combination of two basic forests: the spruce-fir or boreal forest, and the northern lowland or swamp conifer forest. White spruce and balsam fir comprise the majority of tree species in this forest type, while white cedar (*Thuja occidentalis*), black spruce and tamarack (*Larix laricina*) constitute the majority in the second forest type. Typical associates include paper birch, red maple, and alder (*Alnus* spp.). Common shrubs include

round-leaved dogwood (*Cornus rugosa*), hazel, honeysuckle (*Lonicera* spp.), thimbleberry (*Rubus parviflorus*), and blueberries. Other understory plants include sweet gale (*Myrica gale*), leatherleaf (*Chamaedaphne calyculata*), bog rosemary (*Andromeda glaucophylla*), and cranberry (*Viburnum* spp.). However, when the canopy is closed little understory exists.

The peatland community is one of the most dramatic features of the Refuge. Within this area, pine knolls, bog forests, bog hollows, and bog ridges all occur in a unique association. The pine knolls are composed of sand dunes and the following plants are commonly found on them: white, red, and jack pine, red maple, paper birch, white cedar, black spruce, huckleberry, and bunchberry (*Cornus canadensis*). The bog forest is usually located downslope from these knolls and plants commonly found here are tamarack, sphagnum moss, willows (*Salix* spp.), sedges (*Carex* spp.), red maple, labrador tea (*Lecum groenlandicum*), royal fern (*Osmunda regalis*), and dwarf blackberry (*Rubus allegheniensis*). The bog hollows will support bog rosemary, cranberry, pitcher plant (*Sarracenia purpurea*), horsetail (*Equisetum*), cottongrass (*Eriophorum spissum*), and three-way sedge. Finally, the bog ridges are composed of bog birch (*Betula pumila*), leatherleaf, bog rosemary, cranberry, blue flag (*Iris versicolor*), bluejoint (*Calamagrostis canadensis*), and wintergreen (*Gaultheria procumbens*).

Shrub swamps, meadows and marshes are also present on the Refuge. The shrub swamp community is represented primarily by alders. Other species include red osier dogwood, willow, meadowsweet (*Spiraea latifolia*), current (*Ribes* spp.), bedstraw (*Galium* spp.), joe-pye-weed (*Eupatorium* spp.), goldenrod (*Solidago* spp.), and marsh fern (*Thelypteris palustris*). Meadows contain many different herbaceous species and the composition would be related to moisture, exposure, and soil conditions. Marshes provide habitat for grasses, sedges, rushes (*Juncus* spp.), marsh horsetail (*E. palustre*), bladderwort (*Utricularia* spp.), cattails (*Typha* spp.) and bottle gentian (*Gentiana andrewsii*).

Historical and Ecological Role of Fire

Fire functions in the perpetuation of forests, prairies, and wetlands in the Upper Great Lakes region and thus is important in maintaining and restoring populations of associated wildlife species, many of which are seriously declining nationwide (Niemi and Probst 1990, Loope 1991, Albert 1995).

At Seney NWR fire is considered a natural disturbance mechanism in all burnable vegetation communities or on 84, 078 acres out of 95,238. The only acres not considered burnable today are artificial impoundments or pools and northern hardwoods that rarely burned historically.

The ecological role that fire has had in shaping the structure and composition of vegetation has been organized into patterns or fire regimes. These fire regimes varied in their frequency, season, size, immediate effects and intensity with general patterns occurring over long periods of time. The basic processes of a fire return interval and fire severity in general determine the extent of effects fire has on a landscape.

Fire Return Interval

The fire return interval is the average number of years between fires at a given location. Fire records prior to the 1940's are vague and of no use in developing a Refuge specific return interval of naturally occurring fires. Specific evidence was obtained from two fire scarred red pines from the central (C-2 Pool area) and southern (Marsh Creek Road) areas of the Refuge. Both trees recorded fires at their bases before human caused ignitions prior to 1910 as follows:

Red Pine Tree # 1, (C-2 Pool)	1721	O = 29 years
	1758	
	1793	
	1834	
	1866	
	1873	
	1895	

Red Pine Tree # 2 (Marsh Creek Road)	1754	O = 25 years
	1793	
	1844	
	1854	
	1865	
	1899	
	1905	

Based on this limited specific evidence from two fire-scarred tree cross sections the fire return interval for red pine on the Refuge is 29 and 25 years. Although at other sites across North America, native Americans regularly used fire and effected the fire return interval of a given location they are not considered a factor at Seney (Loope 1991). The above trees only recorded fires that burned at their fire scarred bases with some fires in the vicinity of the trees probably not recorded.

The fire return interval for the other vegetation types at Seney was probably highly variable and dependent upon vegetation types and periodic droughts. For the dominant types of shrub-scrub (26% of the Refuge total acres), coniferous forest (24%), marsh (18%), and bog (8%) an average return interval the same as red pine (20 to 30 years) is estimated. Although there are exceptions to this general average within the above types the average interval should approximate historical occurrence.

The shrub-scrub, marsh, and bog cover types contain a variety of fine fuel sedges and grasses that probably burned in concert with adjacent red pine growing on higher ground. Jack pine burned less frequently but with a higher intensity on a probable interval of 50 to 100 years.

The average return interval of 20 to 30 years that is to be applied to the entire Refuge per the FMP will require modifications to fit site specific vegetation types that do not fit into the average interval grouping. The fact that some communities with a greater return interval will not burn when adjacent types do burn may permit the "general average" to work well.

Fire Severity

The severity of a fire describes the immediate effects on vegetation that results from the rate of release of energy in a fire's flaming front and the total heat released during burning. A fire's severity determines the mortality of the dominant vegetation above ground. Three types of fire severity apply to Refuge vegetation communities.

Understory fire regime - fires that generally do not kill or change the dominant vegetation. A majority of the above ground vegetation survives the fire. A red pine stand that undergoes an understory burn every 25 years and remains red pine is a good example.

Stand-replacement regime- a fire that kills above ground vegetation and changes the above ground vegetation structure. A majority of above ground vegetation is killed. A crown fire that kills all above ground jack pine is a good example. Fires in sedge marshes that kill most above ground woody shrubs and sedge also involve a stand-replacing fire regime.

Mixed-severity regime - fires that cause either selective mortality of the dominant vegetation, depending on how susceptible a species is to fire, and varies between understory and stand-replacement. Fires in mixed stands, such as red pine mixed with jack pine, would cause mortality on the thinner barked jack pine, but not kill most thicker barked red pine.

Even though these general fire regimes apply to all Refuge cover types considerable variation in fire effects occurs due to all the variables on any given fire. Fire effects and fire severity patterns are influenced by fluctuations in weather patterns, hydrology, topography, soils, fuels, and stand structures. This variable nature of fires has historically shaped the complex mosaic of size classes, vegetation structure and vegetation occurrence that is found across the Refuge landscape. Without the periodic return of fire, this complex mosaic of habitats will be slowly lost and the biological diversity of life on the Refuge will decline.

3.2.2 Threatened and Endangered Species

Seney NWR is home to two federally listed species, the gray wolf and the bald eagle. Habitat conditions on the Refuge are favorable for the listed lynx if they return to the Upper Peninsula of Michigan.

Gray Wolf

Wolf use of the Refuge has been documented for many years. Production of pups has not been recorded, but is possible. A female fitted with a transmitter was frequently observed in the company of another wolf in the western half of the Refuge in 2000. Observations of tracks and scat have been made throughout the Refuge. A young male wolf was trapped and equipped with a transmitter on Pine Creek Road. The entire Refuge is considered occupied by wolves.

Wolves utilize the Refuge from early April to December. Their Michigan diet has been documented to consist of 55% white-tailed deer, 16% beaver; 10% snowshoe hare and 20 % miscellaneous. In Wisconsin, a study reported beaver can provide as much as 30% of a wolf's

spring diet. The miscellaneous category includes shrews, voles, red squirrels, mice, grouse and crayfish.

The number of occupied territories on the Refuge is not known. The pair of animals frequently observed in the western half of the Refuge in 2000 was considered a pack. In 2001 a pair of wolves were frequently seen along highway M-28 near the northeastern boundary and they probably include the Refuge as part of their territory. It seems likely that packs may include parts of the northwestern, eastern and southeastern sections of the Refuge. Average pack territory size in the Great Lakes is in the range of 100 square miles. Any pack territories that include the Refuge also encompass adjacent state and private forest lands. These other lands are more intensively managed for timber production and have deer densities higher than that found in the Refuge. Prescribed fire will not be used in the vicinity of any identified den sites. In the larger proposed prescribed burns, it is possible an unknown den site could be burned. Fires in July and August would not be expected to cause young of the year any harm. Fire in late April to early May would present a slight hazard to pups should they panic as the fire passes the den site. Fires planned for April/May will receive increased reconnaissance in an effort to avoid den sites. Due to the above factors, fire management activities as described in all three alternatives of this EA are considered to have minimal impact on wolves. Slight differences in the impacts to wolves will be discussed in each alternative.

Bald Eagle

Bald eagle nesting records go back to the early 1940's. Currently there are four active nests with annual production ranging from 1 to 4 fledged eaglets. Immature eagle use peaks at about 10 birds in fall. Active territories are located on B-1, D-1 C-2 and C-3 pools.

Wildfire and prescribed fire can negatively impact eaglet production if active nest trees or potential nest trees are burned. Active nesting trees must receive priority protection from all fires. If threatened by fire, these trees need to have fuels mechanically removed or backfires utilized to prevent fire from reaching them. In addition, potential nesting trees in the vicinity of open water need to be protected from fire. Few trees per pool qualify for fire protection. To be considered a potential nest site, a tree needs to be dominant over the adjacent trees, have an open crown, and be within 1/4 mile of open water. Each pool contains three or four of these high quality "potential nest trees." These potential trees, have not been identified for all pools, but are generally obvious from the road or dike. All potentials need to be protected from fire. If the trees adjacent to a pool are threatened by fire, Refuge staff can identify potential nest trees.

Lynx

Although at the present time lynx are not known to inhabit Michigan, they may someday return. In anticipation of their return, the Refuge plans to maintain and enhance habitats that will benefit the lynx.

In the southern boreal forest of the Refuge, the lynx would be expected to prey primarily on snowshoe hares. The snowshoe hare population of the Refuge cycles from high to low densities over the course of several years. The amplitude of the cycle is thought to be less than in more northern boreal forests, but observations indicate a difference between the high and low years. Other prey items available include red squirrels, small mammals, birds and carrion.

Habitat management and the use of fire in maintaining and enhancing the Refuge for lynx use will require a multifaceted approach. Refuge habitats currently consist of a diverse mosaic of upland and wetland types with complex juxtaposition of different-aged stands.

A key to maintaining the best habitat for lynx is suitable snowshoe hare habitat. Snowshoe hares prosper in early successional habitats resulting from disturbance. The primary natural disturbance factor affecting Refuge habitats has been fire. Past wildfires have created a mosaic of types and a complex mix of different-aged stands.

In 2000 and 2001 the Refuge cooperated with the Ohio Department of Natural Resources in a reintroduction of snowshoe hares to Ohio. During the two winters, a total of 237 hares were live trapped in or near the Refuge and released in northeast Ohio. The most productive winter trapping habitats for hares were the young jack pine stands with very high stem density. In Rugiero's "Ecology and Conservation of Lynx in the United States" optimum hare habitat is described as early successional, disturbance caused and results in high stem densities. Observations of hare use on the Refuge confirm this species requirement of high stem densities with a mix of conifer and hardwood that maximizes cover and protection from predators. High stem densities are most readily achieved as a result of fire, or in some cases forest harvesting operations. However, fire is the only practical method to achieve high stem densities for some species such as jack pine.

Fire (or the lack of it) will have a substantial impact on the quality of snowshoe hare habitat within the Refuge in the years to come.

3.2.3 Other Wildlife Species

The Refuge provides habitat for 20 species of herptofauna, 48 species of mammals, 26 species of fish, and over 200 species of birds. The Great Lakes/Big Rivers Region of the FWS has identified species that are considered Conservation Priorities for the Region. Those species that are plausible inhabitants of the Refuge are listed in Appendix 1 of this EA.

In addition to the FWS regional priority species list, the Partners In Flight (PIF) bird conservation organization has identified priority bird species of concern for the "Boreal Hardwood Transition" area (Physiographic Area 20) which covers Seney Refuge. Several of the PIF priority species are affected by fire (see Appendix 2 for the PIF priorities).

3.3 Land Use

Land use priorities for the Refuge are to comply with: 1) the Executive Order that established the Refuge for the protection and production of migratory birds and other wildlife, 2) the Wilderness Act in managing the wilderness "as an area where the earth and its community of life are untrammelled by man," 3) the National Wildlife Refuge Improvement Act which requires that "the biological integrity, diversity and environmental health of the system be maintained for the benefit of present and future generation of Americans." Land cover within several miles of the Refuge boundary is 98% forested.

3.4 Cultural Resources

Cultural resource sites can be found at several locations throughout the Refuge. Most involve historic hunting camps and temporary residences that are currently difficult to locate. Remaining depressions, debris, and old foundations are most often overgrown with trees and vegetation.

Additional cultural resource sites that are associated with the early days of the Refuge include water control structures, bridges, and buildings at the Headquarters.

There are no known paleontological resource sites identified within the Refuge. During a “Master Planning” process in 1976, Commonwealth Associates, Inc. identified areas along the Manistique River as having the best potential for such sites. To date no resources have been found.

3.5 Local Socio-Economic Conditions

The population of Schoolcraft County was 8,903 in the 2000 Census. From 1990 to 2000 the population increased about 7% (8,302 to 8,903). Land cover within the county is predominantly forest with 65% in state or Federal ownership. In 2000, the primary employment sectors were tourism and forest products/harvesting. The average age of county residents was 41.4 in 2000, up from 37.5 in 1990 (state-wide average age is 35.5). Median household income for the county is \$20,112, with the state-wide median of \$31,020.

3.6 Environmental Justice

The Executive Order 12898 on Environmental Justice issued by President Clinton on February 11, 1994 requires all Federal agencies to assess the impacts of Federal actions with respect to environmental justice. The Executive Order states that, to the extent practicable and permitted by law, neither minority nor low-income populations may receive disproportionately high and adverse impacts as a result of a proposed project.

Due to the rural nature of the proposed fire restoration sites, the surrounding population tends to be in lower income categories but no identifiable group of individuals can be considered to have lower income in relation to local averages. None of the potential restoration areas have any known concentrations of minority populations in the vicinity of the proposed restoration sites. Impacts from all three Alternatives to individuals in the areas surrounding prescribed fire sites are expected to be minimal and so do not represent any disproportionate high and adverse impacts to low-income and minority groups.

3.7 Wilderness

The Wilderness Act describes designated areas as, “an area where the earth and its community of life are untrammelled by man, ... which is protected and managed so as to preserve its natural conditions and which generally appears to have been affected primarily by the forces of nature, with the imprint of man’s work substantially unnoticeable.”

The top two primary forces of nature that make up “natural conditions” of Seney’s Wilderness Area are hydrology and fire. The Refuge is implementing a plan to restore the hydrology of the eastern portion of the Wilderness Area that has been degraded by Walsh Ditch. In order to comply

with the intent of the Wilderness Act, fire, the second “primary force of nature,” needs to be incorporated into Wilderness fire management at Seney NWR.

The FMP provides for the return of naturally occurring fires with the adoption of Wildland Fire Use Planning process. Fires will be evaluated in a three-stage process that will determine if a fire can be managed for identified resource benefits or should be suppressed.

Resource benefits from naturally occurring periodic fires are the same as those identified in Section 3.21.1 (Historical and Ecological Role of fire) of this EA. Benefits to the Wilderness landscape from fire involve the maintenance of a diverse mosaic of vegetation structure, age classes and occurrence. The variable nature of fire historically shaped the diverse Wilderness landscape. Fluctuations in weather patterns, hydrology, topography, soils, fuels, and stand structure affected fire severity patterns. The 1976 Walsh Ditch fire that burned most of the Wilderness demonstrated the variable nature of fire in that within its perimeter fire effects were patchy in nature. It left unburned 63% of the Area, light surface burned 18%, moderately surface burned 7%, hard surface burned 9% and organic soil burned 3%.

The Wildland Fire Use Planning Process is somewhat limited in that any fire permitted to burn must remain “controllable.” Given all the variables that are involved in fire developing on the landscape, the potential risks and threats, and the limited experience in the Great Lakes region with such fire management techniques, it is thought that many (if not most) ignitions will require a suppression response.

In order to improve the likelihood of a fire remaining “controllable” fuel or fire breaks are proposed around the Wilderness boundary. A multi-agency Wildand Fire Use team made up of local agency staff is proposed for development to manage Wilderness fires. Staff prescribed fire experience in the application of fire in roadless Refuge wetlands will increase with the proposed Fire Management Plan. The above strategies of the fuel breaks, a local Fire Use Team and prescribed fire experience in roadless areas should all enhance the probability that future fires in the Wilderness will remain “controllable” and managed for the natural resource benefits fire brings to the landscape.

4. Environmental Consequences

4.1 Alternative A (No Action)

4.1.1 Habitat Impacts

Impacts to habitat from the No Action - Suppression Only Alternative include:

1. Removal of all fire and its effects on vegetation communities. In Anderson’s report on the 1976 fire, he categorized the fire as burning 56,339 acres on the Refuge (16,061 acres on State land and 1,730 acres on private land) which created a mosaic of irregular patterns of unburned habitat and areas that burned in varying degrees of intensity. The resulting complex mosaic that Anderson describes is needed to maintain the Refuge’s “Vision for the Future.” That is, fire is necessary to maintain a complex mosaic of habitats that supports an array of both wetland and upland wildlife species.

2. Burnable habitats on state and private lands adjacent to the Refuge will be protected from Refuge wildfires that are controlled.

3. An impact of a suppression only Alternative on habitat is a buildup of fire fuels. Historically, periodic wildfires limited buildup of fuels and the more frequent fires were less intense. With all wildfires suppressed and no prescribed fire use, fuels will continue to buildup to the point where suppression actions will be ineffective. Intense wildfire resulting from the unnatural buildup of fuel would be expected to regenerate an increase in future fuels (more acres of dense jack pine). This No Action Alternative could result in increasing fuel buildups and increasing danger from wildfires that are difficult to control. This unnatural fuel buildup cycle that has developed since the 1920's of suppressing all wildfires has resulted dramatic changes in Refuge vegetation.

The buildup of fuel concentrations takes many decades. Over one half of the Refuge burned in 1976 (56,339 of the 95,238 acres). This fire reduced fuel concentrations in most areas burned, but may have (in some areas) actually increased future fuel loadings, especially in regenerated jack pine. The portion of the Refuge that did not burn in 1976 (38,873 acres) involves primarily areas east of the Driggs River in pool management Units 1 and 2 that contain several thousand acres of open water. Areas of concern for fuel buildup are located:

- a. In scattered stands of jack pine, spruce and balsam fir east and north of the 1976 fire perimeter.
- b. Along the Driggs River and Pine Creek corridors consisting of drier upland stands of jack, red, and white pine.
- c. On hundreds of islands of dense mature jack pine that were within the perimeter of the 1976 fire but did not burn

Many of the above stands do not appear to have experienced fire for many decades, perhaps as long as 60 to 70 years. Many of these jack pine stands are experiencing insect mortality and invasion by shade tolerant species such as spruce and balsam fir. Red and white pine stands have also experienced understory invasion of spruce and fir. It is in these types of stands where fuel buildups have occurred in the absence of fire. Other impacts include:

1. The loss of the open grassland nature of sedge marshes as they become invaded by woody shrubs and other less fire tolerant grass species.
2. Less organic soil will be lost to ground fire if all wildfires are suppressed.

Impacts to natural conditions in the Wilderness Area due to suppression of all wildfires are as follows:

1. The loss of the mosaic effect on vegetation communities resulting from fire,
2. A buildup of fuel concentrations.
3. A loss of the open nature of sedge marshes due to woody plant invasion.

4. Less organic soil will be lost.
5. The potential use of mechanized equipment as a Minimum Tool to suppress wildfires will leave long lasting scars in the Wilderness Area
6. A gradual, unnatural buildup of fuels will occur up to the point where suppression actions will become less effective in affecting wildfire control.
7. Short-term air quality should be better in the Class 1 Air Shed over the Wilderness with all wildfires suppressed. Visibility impairment from smoke will be less as long as firefighters can suppress each and every fire. As fuel conditions buildup over the years, a fire will eventually occur that cannot be controlled and may contribute more pollution from that single event than what was saved (in terms of pollution) by suppressing all fires for many years.

4.1.2 Wildlife

Impacts to wildlife from the No Action-Suppression only alternative include:

1. Species that require open sedge marshes maintained by periodic fire will decline as woody species and other fire intolerant grass species increase. Yellow rail breeding use of sedge marshes in the Marsh Creek Pool area has been declining after twenty years of good utilization following the 1976 fire. All researchers involved with the yellow rail agree it is a species dependant on sedge (Carex lasiocarpa) maintained by fire in an open condition. Other species are expected to decline include LeConte's sparrow, sandhill crane, sedge wren, sharp-tailed grouse, and northern harrier.
2. Species that benefit from aspen and jack pine regeneration will decline without some form of disturbance. These include ruffed grouse, spruce grouse, snowshoe hare, American woodcock, and beaver..
3. Most of the bird species recorded each year on the Refuge's Breeding Bird Survey route are species commonly found in edge-shrub habitats and in mixed second growth forests. This No Action alternative is not expected to change the use of the Refuge by most bird species. See Appendix 4 for bird species recorded on both Refuge breeding bird surveys.
4. Small mammal populations are not expected to be substantially impacted by this Alternative. Although a lack of periodic fire may result in less favorable plant productivity (seeds, fruit, plant material) and adversely impact some small mammals.
5. Impacts to some larger mammals (fox, coyote, weasels) are tied to impacts to small mammals. White-tailed deer would have less browse available. Black bears would find less productive raspberries, blackberries, and blueberries. Aspen (a preferred beaver forage) would decline without fire. Snowshoe hares preferred winter habitat of very dense young jack pine would disappear without fire. Mink, muskrat, and river otter would not be affected.

6. Reptiles and amphibians may be directly impacted if fire fuels buildup to the point where a wildfire becomes so intense and fast spreading that control efforts fail. Direct mortality is possible for the slower moving snakes and wood turtles.

7. Fish species should not be affected by any of the alternatives

4.1.3 Threatened and Endangered Species

Gray Wolves

Impact to wolves from this No Action - Suppression only alternative involves:

1. A gradual decline in habitat quality for wolf prey species (white-tailed deer, beaver, snowshoe hare) as plant communities advance through plant succession without fire as a disturbance factor.

2. Plant communities that will decline without some form of disturbance include aspen, paper birch, and jack pine. Without fire or timber harvesting operations, these communities will eventually be replaced by more shade tolerant species such as balsam fir and spruce. In general, aspen, paper birch, and jack pine communities provide more desirable conditions for wolf prey species than do balsam fir and spruce.

Bald Eagles

There are no anticipated impacts to bald eagles from this Alternative. This suppression only Alternative provides for protection of active nest trees and potential nest trees.

Lynx

With this No Action Alternative, there would be a gradual loss of quality snowshoe hare habitat in some areas. The eventual loss of dense jack pine and aspen would reduce some of the best quality wintering hare habitat. Eventually most early successional high stem density habitats would grow into more open mature stands and receive less hare use.

4.1.4 Cultural Resources

Suppression of wildfires on refuges may result in new disturbance to land that may have cultural resources. During fire suppression activities, the Refuge Manager will attempt to avoid impacting known cultural resources sites. Shortly after wildfire suppression involving ground disturbance, the Refuge Manager will contact the Regional Historic Preservation Officer (RHPO). Most likely an archeologist will need to investigate the disturbed areas to determine if sites were impacted. If sites are found, additional study, mitigation, or no action as determined by the RHPO in consultation with the State Historic Preservation Officer (SHPO) would follow.

4.1.5 Visual/Aesthetics/Air Shed

As mandated by the Clean Air Act, the Refuge has a responsibility to protect the air quality in the Class I Air Shed over the Wilderness Area. This No Action Alternative will provide the greatest short term protection of air quality with all wildfires suppressed and no prescribed burns. Small wildfires will be extinguished before they generate large quantities of pollution. No fine particulate matter will be released from prescribed burns.

With all wildfires suppressed and prescribed fires not utilized, there will be a gradual and unnatural accumulation of fuels. As the fuels accumulate over time, wildfires will become increasingly more difficult to control. Wildfires resulting from unnatural accumulation of fuels may release more pollutants into the atmosphere than would have resulted from less intense periodic fires.

4.1.6 Visitor Use/Public Safety

With this No Action Alternative, visitor use will not be impacted. Prescribed fires will not impact visitor use of the Refuge because there will be no burns. In the long term, a policy of no prescribed burning will lead to an unnatural buildup of fire fuels. This fuel buildup will be setting the stage for future wildfire behavior and would be expected to pose an increasing hazard to public safety.

4.1.7 Economic

Impacts to local communities from this Alternative are anticipated to be very minor. Suppression of all wildfires will require personnel from outside the local area and this could benefit the local economy. Private structures and timber values off Refuge will be protected with wildfire suppression. Without prescribed fire, fire behavior intensity is expected to gradually increase and with it the potential for substantial economic loss from a catastrophic fire.

4.1.8 Cumulative Impacts

“Cumulative Impacts” are those impacts on the environment which result from the incremental impact of this Alternative when added to other past, present, and reasonably foreseeable future actions. Cumulative impacts can result from individually minor but collectively substantial actions taking place over a period of time.

Cumulative impacts from the Refuge from this Alternative involve the effects of the past and present policy of suppression of all wildfires. The effects accumulate very gradually over decades. Prescribed fires of the 1990's that involved fire application to 3,242 acres reduced cumulative impacts on those acres. The 1976 wildfire burned 35,623 Refuge acres adding to the mosaic of habitats and age classes, reduced fuel hazards, and regenerated thousands of acres of aspen, jack pine, and paper birch.

In describing the cumulative impacts of this Alternative, it is assumed that all wildfire control actions will be effective and wildfire effects on habitat will be minimal. Cumulative impacts also involve what has happened in general to habitats and wildfire fuels outside the Refuge. The Michigan Department of Natural Resources Lake Superior State Forest (Shingleton Management

Unit) at 372,447 acres surrounds the Refuge and comprises approximately 90% of the adjacent land within five miles of the Refuge boundary. All wildfires are suppressed as soon as possible on all state controlled lands. The Shingleton Unit is actively managed with timber sales utilizing clearcuts and thinnings. A variety of forest types are maintained in early successional conditions with cutting. Wildfire fuel accumulations are reduced in areas regenerated and age class diversity is maintained. In 1995, the Shingleton Management Unit contained a variety of early successional habitat types that had been regenerated with clearcutting. Forest types, aged 0 to 9 years for the unit in 1995, included:

<u>Type</u>	<u>Acres</u>
Jack Pine	7,054
Red Pine	975
Aspen	700
Northern Hardwoods	458
Lowland Conifer	348
Lowland Aspen	340
Balsam Fir	330
Spruce	319
Birch	255
Lowland Hardwoods	185
Cedar	114
Tamarack	94
White Pine	67

For lands adjacent to the Refuge the cumulative impact of land management on wildfire fuel buildup and habitat diversity has provided for reduced wildfire fuel accumulations and habitat diversity. These cumulative impacts from off Refuge lands have resulted from clearcutting. Although clearcutting has reduced the cumulative impacts, there are differences in habitat quality between habitat regenerated by fire and that regenerated by clearcutting. Fire regenerated habitats generally have more snags, higher stem densities, and higher diversity of understory shrubs and groundcover than habitats regenerated by cutting.

Cumulative impacts from wildfire suppression and fuel hazard buildup also need to consider the impact on a regional and national level. Suppression of all wildfires and a lack of prescribed fire have resulted in a growing number of large, catastrophic fires regionally and nationally. Catastrophic fires that are difficult to control are now an all too common occurrence from Florida to the western United States. A fire management strategy of suppression of all wildfires and no prescribe fire use (Alternative A, this document) contributes to the increased fuel hazard buildup at regional and national levels.

The cumulative impacts of this Alternative for the Refuge only is as follows:

1. The continued gradual loss over decades of the mosaic of many habitat types and age classes.
2. A fuel hazard buildup that increases fire behavior and potentially threatens those habitat types that evolved with periodic fire

3. A gradual increase in the wildfire hazard to the public from a buildup of fuels
4. The loss of habitats dependent on fire for regeneration (aspen, paper birch, jack pine)

4.1.9 Environmental Justice

The Executive Order 12898 on Environmental Justice issued by President Clinton on February 11, 1994 requires all Federal agencies to assess the impacts of Federal actions with respect to environmental justice. The Executive Order states that, to the extent practicable and permitted by law, neither minority nor low-income populations may receive disproportionately high and adverse impacts as a result of a proposed project.

None of the proposed Alternatives will result in impacts to minority or low-income populations that differ from impacts to the general populations in the area surrounding the Refuge. The impacts from all three Alternatives on human activities in the areas surrounding the Refuge are expected to be minimal, and do not represent any disproportionately high or adverse impacts to low-income or minority groups.

4.2 Alternative B (Suppression with Prescribed Fire)

4.2.1 Habitat Impacts

Impacts to habitat from Alternative B include:

1. All the habitat impacts identified in Alternative A (No Action - page 12 and 13) from a suppression only action apply to this Alternative except for five habitat types that will receive prescribed fire treatments. The five habitat types are wet sedge marsh, jack pine and aspen regeneration, grassland opening/red pine savanna habitats, red and white pine restoration, and maintenance of dikes and adjacent wetlands involving a total of approximately 13,000 acres.
2. Periodic growing season fires (July & August) in wet sedge marsh (6,000+ acres) will maintain the habitat in a more open natural condition. Fire application during the growing season can kill the invading bog birch, willow and tag alder and favor fire dependant Carex lasiocarpa over other sedges and grasses less fire tolerant. The primary focus area for sedge marsh maintenance burns will be south, west, and north-northwest of Marsh Creek Pool
3. Stand-replacing prescribed fire in jack pine and aspen (2,000 acres) will reduce fuel concentrations and regenerate both types. Areas of focus for these types of prescribed burn are found on the drier sites along roads and adjacent to pools where physical barriers can be utilized for control.
4. Prescribed fire will be used to maintain drier open grasslands and red pine savanna systems (2,000 acres). Fire would be utilized to maintain these historic open areas by killing invading jack pine and aspen. Periodic enhancement of blueberry production would

result in the years following fire.

5. Restoration and maintenance of up to 2,000 acres of red and white pine stands. These stands have been invaded by jack pine and aspen or are open areas of primarily lichens and charred stump fields and are a result of all the human caused cutting and fires in the early 1900's. Many Refuge jack pine and aspen stands are growing in extensive areas of red and white pine stump relics. The old stumps were preserved by fire and still stand as a testament to historical conditions. Along the Driggs River and Pine Creek, many "barren" areas still persist even though 100 years has past since logging and intense slash fires. Frequent prescribed fire can be used to kill jack pine and to eliminate the resulting reproduction. Planting of red or white pine, if necessary, would then move many sites closer to historic conditions.

6. Maintenance of dikes and adjacent wetland habitats free of woody plants and invasive exotic species. Trees and woody shrubs weaken pool dikes creating channels for the passage of water and increased animal damage. Dikes are frequently invaded by invasive plants such as glossy buckthorn, and once established they become sources of infestation for adjacent wetlands. Fire when used in combination with mowing can be effective in controlling woody and invasive plants on dikes and in adjacent wetlands involving up to 1,000 acres.

7. Plowed fire breaks will be necessary to control the extent of prescribed burns. Soil disturbance will provide invasive plants, such as spotted knapweed, with an opportunity to invade areas away from the disturbed road sides. Fire lines will be monitored for invasion of exotic plants and control actions taken if needed.

With the application of prescribed fire there is a risk of organic soil fire and resulting soil loss. Such soil losses from, "ground fire" were natural in pre-settlement times, but are not acceptable today because of smoke and air quality issues; groundwater levels will be monitored and burning will not take place if levels are much below the surface. Any ground fire that does result from prescribed fires will be aggressively extinguished.

4.2.2 Wildlife Impacts

Impacts to wildlife from Alternative B include:

1. Direct mortality from the five types of prescribed burns. Although fire use may cause some direct mortality, the effects are short term in duration with populations rebounding in one or two growing seasons.
2. Prescribed fire will be conducted prior to the nesting of most ground nesting birds before May 15 or after nesting is finished in July or August. Bird nesting cover and ground foraging sites will be lost for that season. Other direct mortality is possible with wood turtles, red-bellied, common garter and smooth green snakes, American toads, and a variety of insect life stages. Small mammal populations (shrews, voles, mice, chipmunks) can be reduced following a fire, but their populations generally return to pre-burn levels within one to two years. Other direct mortality to wildlife is expected to be minimal.

3. In sedge marshes, fire will eliminate necessary overhead cover for yellow rails for one growing season. In the years following fire, Carex lasiocarpa should dominate with less competition from woody species and other less fire tolerant grasses and sedge. Yellow rails should find these conditions ideal for breeding for several years following fire. Other species that should benefit from periodic fire in the sedge marsh habitat are sedge wrens, LeConte's sparrow, sandhill cranes, northern harriers and a variety of cavity nesting birds. The potential for cavity trees will be enhanced when fire causes some tree mortality on the many islands found in the sedge marshes

4. Wildlife species benefiting from stand replacing fires in jack pine and aspen include a variety of cavity nesting birds, beaver and the wildlife associated with beaver ponds, snowshoe hare, lynx, ruffed and spruce grouse, and American woodcock.

5. Species benefiting from fire maintenance of open grasslands and pine savannas include bobolink, upland sandpiper, American woodcock, sandhill crane, sharp-tailed grouse, small mammals (shrews, voles, and mice), and other grassland nesting birds.

4.2.3 Threatened and Endangered Species

Gray Wolves

Wolf prey species (e.g., white-tailed deer, beaver, and snowshoe hare) should benefit from stand-replacing fires in jack pine and aspen. Without fire or cutting, aspen and jack pine will gradually decline in the Refuge landscape.

As discussed in 3.2.2 (page 17) there is a potential hazard to pups at den sites from April-May prescribed fires. Wildfires historically occurred in mid to late summer in July and August. Most prescribed fires will take place during the growing season late summer period, however due to lower humidity and lower fuel moisture, some burns will occur in late April to mid-May, prior to green-up. In order to prevent any harm to pups during the April-May period, pre-burn reconnaissance will specifically be targeted at locating den sites. All areas within a burn perimeter will be walked on parallel lines within sight of the adjacent individuals. If any den sites are located the area will be immediately vacated and burn plans for the site will be withdrawn.

Bald Eagles

There should be no impact from this Alternative. Active nest trees and potential nest trees will receive priority protection in all three Alternatives.

Lynx

Lynx should benefit from the dense regeneration of jack pine resulting from fire. Dense, "doghair," young jack pine is considered the very best wintering habitat found on the Refuge for snowshoe hares. Jack pine regeneration resulting from timber harvest does not provide for enough stems per acre to be attractive to hares.

4.2.4 Cultural Resources

Suppression of wildfires on refuges may result in new disturbance to land that may have cultural resources. During fire suppression activities, the Refuge Manager will attempt to avoid impacting known cultural resources sites. Shortly after wildfire suppression involving ground disturbance, the Refuge Manager will contact the Regional Historic Preservation Officer (RHPO). Most likely an archeologist will need to investigate the disturbed areas to determine if sites were impacted. If sites are found, additional study, mitigation, or no action as determined by the RHPO in consultation with the State Historic Preservation Officer (SHPO) would follow.

4.2.5 Visual/Aesthetics/Air Shed

As mandated by the Clean Air Act, the Refuge has a responsibility to protect the air quality of the Class I Air Shed over the Wilderness area.

The best smoke management practices known will be utilized to keep the extent of smoke generated to a minimum. Weather conditions that provide for rapid smoke transport will be a priority. Smoldering debris will be extinguished as soon as possible. Prescribed burn plans must comprehensively address those best smoke management practices that apply and are specific to an individual burn plan proposed.

4.2.6 Visitor Use/Public Safety

Visitor Use

Visitor use of some areas of the Refuge will be impacted by this Alternative. During prescribed burns roads will be closed to all public entry for safety reasons. Short-term smoke episodes may also require roads be closed to protect the health of visitors. The seven-mile wildlife drive, open to the public from May 15 to October 15, may need to be closed for a day or two during a burn.

Public Safety

In the Fire Management Plan, Section XI on the Prescribed Fire Program there is a detailed description of the FWS prescribed fire program. Section XI of the Fire Management Plan is included in this Environmental Assessment. Safety is a top priority in all aspects of planning and conducting burns.

In the planning process, each burn is evaluated based on variety of factors. The more complex burns require increased planning, preparation and personnel to conduct the burns in an effective and safe manner.

No burns will be planned or conducted unless they can be controlled and completed in a manner that assures the safety of Refuge neighbors, visitors, and personnel conducting the burns.

The three types of prescribed burns proposed in this Alternative B involve different degrees of complexity.

1. Sedge marsh burns are moderately complex burns due to their location, fine grass fuels and the presence of organic soils.
2. Stand-replacing burns in mature to over mature jack pine and aspen would be considered high complexity burns due to the intensity of the fire needed to kill mature trees and open serotinous cones. Serotinous cones remain closed on jack pines until they are heated by fire.
3. Upland grassland and pine savanna burns are low complexity burns due to the lower intensity of fire generated and the presence of control features such as roads and ditches.

4.2.7 Economic

Economic impacts from this Alternative are anticipated to be minor. Personnel brought into the area to conduct prescribed burns will benefit the local economy. Burning of approximately 2,000 acres of mature standing jack pine and aspen, will produce no local economic benefit as opposed to selling and cutting the trees. Timber sales do not result in the type of regeneration achieved with fire nor does timber harvest provide for other wildlife benefits.

Prescribed burns do provide for a degree of protection from economic loss due to a reduction in the hazards from catastrophic wildfire. Wildfire fuel hazards on the Refuge do present a threat to local economic values. Prescribed fires reduce wildfire hazards in the areas treated and reduce the risk of wildfires escaping the Refuge.

4.2.8 Cumulative Impacts

The trend of accumulating impacts from a suppression of all wildfires policy (as covered in 4.1.8 Alternative A - No Action) will be reversed on 13,000 Refuge acres with this Alternative B as follows:

1. The maintenance of the current mosaic of habitat types and age classes on 13,000 acres proposed for prescribed burn treatments involving six habitat types - sedge marsh, jack pine, aspen, upland grasslands, red pine savannas and red and white pine.
2. Reduction in fuel hazard buildup on 13,000 acres and the return of fire to those habitat types that evolved with periodic fire.

4.2.9 Environmental Justice

Alternative B will not result in impacts to minority or low income populations that differ from impacts to the general populations in the area surrounding the Refuge

4.3 Alternative C (The Proposed Action)

4.3.1 Habitat Impacts

Impacts to habitat from Alternative C include:

1. Wildfires permitted to burn in Unit 2 and Unit 3, as provided per the Wildland Fire Use Planning Process, will restore natural diversity to plant community structure and composition in areas burned.
2. Impacts associated with suppression of all fires in Unit 1 are the same as those identified in Alternative A.
3. With the use of prescribed fire to mimic the effects of wildfire, some tree species that invaded fire tolerant communities will decline. In the absence of fire, balsam fir and white spruce have increased throughout the Refuge. The return of periodic fire will reverse this trend of the past 60 years.
4. Tree species that require stand replacement fires for regeneration or periodic lower intensity fires for maintenance will benefit from this Alternative and include aspen, white birch, jack pine, red and white pine and sedge marshes.
5. Fire will be used to restore historic forest types of red and white pine in areas currently occupied by other cover types and in areas where there has been little forest recovery since logging and slash fires of 100 years ago. Many stands of jack pine are growing over red and white pine stumps as a result of the unnatural fires of many years ago. Fire will be used to remove the jack pine from the sites and restore them to red and white pine.
6. Fire application per this Alternative will result in an increase in snags and dead wood throughout the Refuge. According to Brown and Bright (1997), "The snag represents perhaps the most valuable category of tree-form diversity in the forest landscape." Snags and dead wood benefit a wide range of wildlife including insects, birds, small and large mammals and amphibians.
7. An increase in fire control lines will be needed to implement the proposed prescribed fire program. Water will be used whenever possible but plowed or bladed lines will be needed on many burns. The disturbed soil will create conditions suitable for invasive non-native plants such as spotted knapweed. Control lines with disturbed soil will require monitoring for several years and control actions may be needed if invasives do become established. Cleaning of tracks contaminated with seeds is a standard operating procedure.

4.3.2 Wildlife Impacts

Impacts to wildlife include all those identified in Alternative B and additional impacts:

1. Direct mortality from a wide-range of prescribed burns. Although fire use may cause some direct mortality, the effects should be short term with populations rebounding in one

or two growing seasons.

2. Prescribed fire will be conducted prior to the nesting of most ground nesting birds (e.g., before May 15 or after nesting is finished in July or August). Bird nesting cover and ground foraging sites will be lost for that season. Other direct mortality is possible with wood turtles, red-bellied, common garter, and smooth green snakes, American toads, and a variety of insect life stages. Small mammal populations (shrews, voles, mice, chipmunks) can be reduced following a fire, but their populations generally return to pre-burn levels within one to two years. Other indirect mortality to wildlife is expected to be minimal.

3. In sedge marshes (approximately 11,163 acres), fire will eliminate necessary overhead cover for yellow rails for one growing season. In the years following fire, Carex lasiocarpa should dominate with less competition from woody species and other less fire tolerant grasses and sedge. Yellow rails should find these conditions ideal for breeding for several years following fire. Other species that should benefit from periodic fire in the sedge marsh habitat are sedge wren, LeConte's sparrow, sandhill crane, northern harrier, and a variety of cavity nesting birds. The potential for cavity trees will be enhanced when fire causes some tree mortality on the many islands found in the sedge marshes.

4. Wildlife species benefiting from stand replacing fires in jack pine and aspen (approximately 2,000 acres) include a variety of cavity nesting birds, beaver and the wildlife associated with beaver ponds, snowshoe hare, lynx, ruffed and spruce grouse, and American woodcock.

5. Species benefiting from fire maintenance of open grasslands and pine savannas include bobolink, upland sandpiper, American woodcock, sandhill crane, sharp-tailed grouse, small mammals (shrews, voles, and mice) and other grassland nesting birds.

6. The restoration and conversion of mixed stands of aspen and jack pine to historic conditions of red and white pine-dominated stands will reduce the use of those sites by white-tailed deer and a variety of bird species that utilized mixed forest. Most of the birds recorded on annual breeding bird surveys of the Refuge are species that utilize mixed forest habitats. Once the restoration to white and red pine is complete, a variety of bird species that utilize coniferous forest would be expected to prosper and include: red crossbill; pine, black-throated green, and Blackburnian warblers; brown creeper, red breasted nuthatch, and slate-colored juncos.

7. Bird species abundance shifts with the passage of fire in that species that forage in trees decline and ground and shrub forages increase. Forest interior species such as golden-crowned kinglet, Cape May warbler, and ovenbird would be expected to decline with fire and edge/shrub species of common yellowthroat, white-throated sparrow, and song sparrow would increase. Anderson reported that following the 1976 Seney fire, many bird species were recorded as breeders only on burned plots- killdeer, common snipe, black-backed woodpecker, brown creeper, winter wren, northern oriole, Brewer's blackbird and savannah sparrow. Species recorded only on unburned plots included American woodcock, veery, golden-crowned kinglet, golden-winged warbler, American redstart, indigo bunting, and LeConte's sparrow. The magnitude of change on species can be

masked somewhat if unburned vegetation patches remain within the burned perimeter.

4.3.3 Threatened and Endangered Species

Gray Wolf

Wolf prey species (e.g., white-tailed deer, beaver, and snowshoe hare) should benefit from stand replacing fires in jack pine and aspen. Without fire or forest harvesting operations, aspen and jack pine will gradually decline in the Refuge.

Bald Eagles

There should be no impact from this Alternative on eagles. Active nest trees and potential nest trees receive priority protection in all three Alternatives.

Lynx

Lynx should benefit from the dense regeneration of jack pine and aspen resulting from the prescribed fire proposed. Sedge marsh maintenance should have no effect. The restoration of red and white pine via the conversion from mixed forests and stump fields should also have no effect. Mixed uplands forests rarely contain high enough stem densities to benefit snowshoe hares. The restoration of red and white pine to jack pine islands should have no effect. Although jack pine stands on islands have the potential for high stem densities they generally are not used by snowshoe hares because of a lack of adjacent cover. Most islands are surrounded by open sedge marsh with a band of tag alder at the perimeter. Snowshoe hare use of pine islands in a sea of sedge marsh is low.

4.3.4 Cultural Resources

Suppression of wildfires on refuges may result in new disturbance to land that may have cultural resources. During fire suppression activities, the Refuge Manager will attempt to avoid impacting known cultural resources sites. Shortly after wildfire suppression involving ground disturbance, the Refuge Manager will contact the Regional Historic Preservation Officer (RHPO). Most likely an archeologist will need to investigate the disturbed areas to determine if sites were impacted. If sites are found, additional study, mitigation, or no action as determined by the RHPO in consultation with the State Historic Preservation Officer (SHPO) would follow.

4.3.5 Visual/Aesthetics/Air Shed

As mandated by the Clean Air Act, the Refuge has a responsibility to protect the air quality of the Class I Air Shed over the Wilderness area.

The best known smoke management practices will be utilized to keep the extent of smoke generated to a minimum. Weather conditions that provide for rapid smoke transport will be a priority. Smoldering debris will be extinguished as soon as possible. Prescribed burn plans must comprehensively address those best smoke management practices that apply and are specific to an individual burn plan proposed.

4.3.6 Visitor Use/Public Safety

Visitor Use

Visitor use of some areas of the Refuge will be impacted by this Alternative. During prescribed burns, roads will be closed to all public entry for safety reasons. Short-term smoke episodes may also require roads be closed to protect the health of visitors. The seven-mile wildlife drive, open to the public from May 15 to October 15, may need to be closed for a day or two during a burn.

Visitor use of the Refuge during wildfire events will vary depending upon the severity and location of the fire. Access to any area potentially threatened by fire will be closed to the public. The entire Refuge beyond the Visitor Center and office area could potentially be closed.

Public Safety

In the Fire Management Plan, Section XI on the Prescribed Fire Program (pages 32 to 39), there is a detailed description of the FWS prescribed fire program. Safety is a top priority in all aspects of planning and conducting burns.

In the planning process, each burn is evaluated based on variety of factors. The more complex burns require increased planning, preparation and personnel to conduct the burns in an effective and safe manner.

No burns will be planned or conducted unless they can be controlled and completed in a manner that assures the safety of Refuge neighbors, visitors and personnel conducting the burns.

Prescribed Fire under Public Safety

A variety of prescribed burns will be planned each year to mimic the effects of wildfire. These fires will represent the full range of fire regimes including understory, stand-replacement, and mixed severity fires. The degree of complexity will be as varied as the intensity of fires required. The more complex and larger fires will be highly complex requiring a complex crew and equipment. Aerial ignition and suppression by helicopter will probably be needed to accomplish the more complex burns in a safe and effective manner.

The safety of the personnel conducting the burns, visitors to the Refuge, and the general public will be top priorities for all burns. Contingencies for fires that escape planned burn boundaries will assure burns remain under control. Burn plan requirements for maintaining minimum visibility standards on public roadways will assure highway safety.

Fuel/Fire Breaks

Fire breaks proposed for Refuge boundaries will reduce risks to public safety. Proposed fire breaks along the north and northwest boundaries will provide a more effective barrier to fires moving from the Wilderness Area to the north and northwest. Fuels management proposals for boundaries adjacent to Germfask and along the Manistique River corridor will improve fire safety for town residents and property owners.

4.3.7 Economic

Economic impacts from this Alternative are anticipated to be minor. Personnel brought into the area to conduct prescribed burns will benefit the local economy. Burning of mature standing jack pine and aspen will produce no local economic benefit as opposed to selling and cutting the trees. Timber sales do not result in the type of regeneration achieved with fire nor does timber harvesting provide for all wildlife.

During extended drought and periods of extreme fire danger, there exist serious potential threats from the Refuge to local property values. Fuels are present on the Refuge that if ignited under certain conditions could develop into rapidly advancing, stand-replacing fires. Such fires could and probably would leave the Refuge and burn homes and timber in the surrounding area.

Prescribed burns provide for a degree of protection from economic loss due to a reduction in the hazards from catastrophic wildfire. Wildfire fuel hazards on the Refuge do present a threat to local economic values. Prescribed fires reduce wildfire hazards in the areas treated and reduce the risk of wildfires escaping the Refuge.

4.3.8 Cumulative Impacts

The trend of accumulating impacts from a suppression of all wildfires policy (as covered in 4.1.8. Alternative A - No Action) is reversed on 60,078 acres (Wildland Fire Use) with this Alternative C - Proposed Action as follows:

1. The maintenance of the current mosaic of habitat types and age classes on 62,578 acres proposed for prescribed burn treatments involving all habitat in Units 1 and 2.
2. A reduction in fuel hazard buildup and the return of fire to those habitat types that evolved with periodic fire.

Cumulative Impacts from management actions that takes place off the Refuge in the surrounding landscape also impact threatened and endangered species that utilize the Refuge. Section 4.1.8. (Page 26) describes the forest management activities occurring in the Lake Superior State Forest - Shingleton Management Unit. Those activities of forest regeneration enhance habitat for prey species that benefit both wolves and, potentially, lynx. Regeneration of aspen, jack pine, and lowland hardwoods and conifers provides improved conditions for white-tailed deer, beaver, and snowshoe hares. The forest management activities that have occurred and are ongoing in the adjacent Lake Superior State Forest and the proposed use of prescribed fire on 62,578 acres of Refuge lands should cumulatively benefit both the wolf and lynx.

Cumulative impacts from wildfire suppression and fuel hazard buildup also need to consider the impact on a regional and national level. Suppression of all wildfires and a lack of prescribed fire have resulted in a growing number of large, catastrophic fires regionally and nationally. Catastrophic fires that are difficult to control are now an all too common occurrence from Florida to the western United States. A fire management strategy of Wildfire Use in Units 2 and 3 and proposed prescribed fire use in Units 1 and 2 (the Proposed Action, Alternative C) will reduce the fuel hazard buildup within the Refuge and (to some extent) within the Upper Great Lakes Region

overall.

4.3.9 Environmental Justice

Alternative C (The Proposed Action) will not result in impacts to minority or low income populations that differ from impacts to the general population on the area surrounding the Refuge.

4.4 Summary of Environmental Consequences by Alternative

Impacts	Alternative A (No Action)	Alternative B (Suppression, etc.)	Alternative C (Fire Use, etc.)
Biological Integrity, Environmental Health	Gradual decline	Restoration of the fire to 13,000 acres	Restoration of fire to 62,578 acres
Wildfire Fuel Hazards	Gradual increase	Reduced (13,000 acres)	Reduced (62,578 acres)
Threatened & Endangered Species*	No effect	Improved	Most Improved
Visitor Use/Public Safety	Increasing hazards	Improved	Most Improved
Visual/Aesthetics/ Airshed	No short term impacts	Short term impacts	Short term impacts
Wilderness Values/Conditions	Degraded	Degraded	Improved
Cultural/Paleontological Resources	No effect	No effect	No effect
Economic Values	Gradual increase in hazards	Reduced hazards on 13,000 acres	Reduced hazards on 62,578 acres
Wildlife*	Gradual decline	Improved	Most Improved

5. List of Preparers:

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Technical Support from: Laural Tansy, Administrative Assistant, and R. Gregory Corace, III, Refuge Forester, Seney National Wildlife Refuge, Seney, Michigan.

6. Consultation and Coordination with the Public and Others

After this draft is approved for public review, we will seek consultation and coordination with the Public and others during a 30-day comment period.

7. Public Comment on Draft-Included with Final EA

8. References Cited

- Albert, D. 1995. Regional landscape ecosystems of Michigan, Minnesota, and Wisconsin: a working map and classification. United States Forest Service, North Central Forest Experiment Station., St. Paul, MN. 250pp.
- Anderson, Stanley H. 1982. Effects of the 1976 Seney National Wildlife Refuge Fire on Wildlife And Wildlife Habitats. U.S. Department of Interior, Fish and Wildlife Service, Resource Publication 146:1-27.
- Bookout, T.A. 1995. Yellow Rail (*Coturnicops noveboracensis*). In the Birds of North America, No. 139 (A. Poole and F. Gill, eds.) The Academy of Natural Sciences, Philadelphia, and the American Ornithologists' Union, Washington D.C.
- Brewer, R.; McPeck, G., Adams, R.J. 1991. The Atlas of Breeding Birds of Michigan, Michigan State University Press, East Lansing.
- Brown, T. K. and L. Bright. 1997. Wildlife habitat preservation and enrichment during and after fires. In: Greenlee, J. M., ed. Proceedings, 1st conference on fire effects on rare and endangered species and habitats; 1995 November 13-16; Coeur d'Alene, ID. Fairfield, WA: International Association of Wildland Fire: 65-68.
- Loope, W. L. 1991. Interrelationships of fire history, land use history, and landscape pattern within Pictured Rocks National Lakeshore, Michigan. Canadian Field-Naturalist 105: 18-28.
- Loope, Walter L. and Anderton, John B. 1998. Human vs. Lightning Ignition of Presettlement Surface Fires in Coastal Pine Forests of the Great Lakes. Vol. 140, No. 2, The American Midland Naturalist.
- Ruggiero, L. F., Aubry, K. B., Buskirk, S. W., Koehler, G. M., Krebs, C. J., McKelvey, K. S., and J. R. Squires. 2000. Ecology and Conservation of Lynx in the United States. University Press of Colorado, Boulder, CO.

APPENDICES

- One: Conservation Priorities for Region 3
Two: Partners In Flight (PIF) Bird Priorities
Three: Breeding Bird Survey - USFWS, Seney National Wildlife Refuge
Four: Bird List of Seney National Wildlife Refuge
Five: FWS Conservation Priorities Impact Matrix

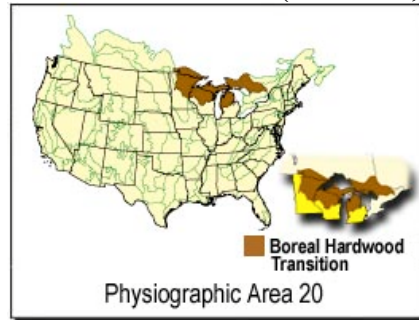
APPENDIX 1: CONSERVATION PRIORITIES FOR REGION

Terrestrial vertebrate species listed as Fish and Wildlife Resource Conservation Priorities (FWS Region) that are plausible inhabitants of lands managed by Seneey National Wildlife Refuge and may potentially be affected by fire. Inadequate information on plant species precludes their addition to this list. Species are listed by general habitats used and conservation concern status.

Priority Species	Habitats	Concerns
Gray Wolf	Mixed and Coniferous Forests	Endangered
American Bittern	Wetlands, Beaver Ponds	Rare/Declining
Wood Duck	Wetlands, Beaver Ponds, River Bottomlands	Recreational/Economic Value
American Black Duck	Wetlands, Beaver Ponds	Recreational/Economic Value
Mallard	Wetlands, Beaver Ponds	Recreational/Economic Value
Blue-winged Teal	Wetlands, Beaver Ponds	Recreational/Economic Value
Bald Eagle	Open Water, Pine Nesting Trees	Threatened
Northern Goshawk	Mixed and Coniferous Forest	Rare/Declining
Northern Harrier	Bog, Open Wetlands w/Shrubs	Rare/Declining
Yellow Rail	Bog, Wet Open Sedge Marsh	Rare/Declining
American Woodcock	Mixed Forest, Wetlands	Rare/Declining Recreational/ Economic Value
Sedge Wren	Bog, Wetland w/Shrubs	Rare/Declining
Wood Thrush	Mixed Forests	Rare/Declining
Golden-winged Warbler	Mixed Forests, Shrub Wetlands	Rare/Declining
Cape May Warbler	Coniferous Wetlands w/Sphagnum	Rare/Declining
Connecticut Warbler	Mixed Forest	Rare/Declining
Canada Warbler	Mixed Forest	Rare/Declining
Black-billed Cuckoo	Mixed Forest, Shrub	Rare/Declining
Whip-poor-will	Mixed Forest, Dry Open Understory	Rare/Declining
Northern Flicker	Mixed Forest, Open Understory	Rare/Declining
Olive-sided Flycatcher	Mixed Forest, Open Understory	Rare/Declining
LeConte's Sparrow	Bog, Sedge Marsh, Shrubs	Rare/Declining
Bobolink	Bog, Open Upland Grasslands	Rare/Declining
Rusty Blackbird	Wetland Forests Shrubs	Rare/Declining

APPENDIX 2: PARTNERS IN FLIGHT (PIF) PRIORITIES
FOR BOREAL HARDWOOD TRANSITION (PHYSIOGRAPHIC STRATA 20)

Boreal Hardwood Transition(Area - 26,512,396 ha)



Executive Summary

Description - As the name implies, this area is a transition zone between the mixed hardwood forest to the south and the boreal forest to the north. Northern Minnesota, Wisconsin, and Michigan are in this physiographic area, as is much of southern Ontario and a small area of southeast Manitoba. The Great Lakes are a prominent ecological force in this area, affecting microclimates and forest community composition. These forest communities are a heterogeneous matrix with various oaks, maples, birch, and pines representing the southern element and spruces, tamarack, and balsam fir of boreal origin. Aspen is a common early successional species throughout.

Priority Bird Populations and Habitats

Grasslands

Nelson's Sharp-tailed Sparrow

LeConte's Sparrow

Sedge Wren

Wetlands

Piping Plover

Yellow Rail

Shrub-scrub

Golden-winged Warbler Highest percent population of any physiographic area.

Connecticut Warbler

Deciduous forest

Wood Thrush

Veery

Rose-breasted Grosbeak

Coniferous forest

Kirtland's Warbler

Canada Warbler

Conservation recommendations and needs - This area remains heavily forested, but the nature of that forest has changed substantially since European settlement. Because pre-settlement disturbances were rare, much of the forest was in a mature or old growth condition. Within this transition zone between major forest types, small-scale environmental differences created an extremely varied mix of forest types. Timber harvest strategies have greatly reduced the average age of the forest and it has become much more homogeneous in both species composition and age. The habitat needs of priority forest birds in this system must be well-understood, and that knowledge assimilated into forest management techniques that will maintain an appropriate extent and diversity of conditions over large landscapes. Within the largely forested physiographic area lies the entire breeding range of Kirtland's Warbler, and it is a very high priority to continue the intensive fire and cowbird control management underway there. Also, although they are limited in area in comparison to forest, wetland and grassland habitats are in need of conservation attention.

APPENDIX 3: BREEDING BIRD SURVEY

Number of individuals of the most common species counted on the FWS Breeding Bird Surveys (BBS) and Hiawatha Breeding Bird Surveys, Seney National Wildlife Refuge, 8-year mean (1992-99) and 1999.^a Names of neotropical migrant species are capitalized.

Species	Hiawatha						Imp. Value ^b
	BBS		Pine Creek		Driggs River		
	92-99	99	92-99	99	92-99	99	
Sandhill Crane	39.3	37	18.0	2	23.3	9	12.6
OVENBIRD	42.9	48	20.3	18	17.6	16	12.5
COMMON YELLOWTHROAT	52.8	59	14.8	16	13.6	14	12.1
Canada Goose	46.6	24	15.5	18	10.5	4	10.3
White-throated Sparrow	35.9	27	15.1	9	12.1	6	9.6
Hermit Thrush	34.6	34	13.0	20	12.6	13	9.2
Myrtle Warbler	31.4	15	10.3	3	12.6	7	8.3
Red-winged Blackbird	38.3	45	5.9	6	9.6	12	7.9
NASHVILLE WARBLER	30.8	42	10.3	13	8.3	13	7.4
RED-EYED VIREO	26.9	31	10.5	10	10.9	7	7.4
CHIPPING SPARROW	18.4	13	9.2	5	10.8	10	6.0
Swamp Sparrow	25.5	23	5.8	3	3.8	2	5.1
Common Snipe	18.4	16	6.6	5	7.1	4	4.9
American Crow	21.0	13	7.0	5	4.3	2	4.8
Blue Jay	14.1	21	9.3	5	4.9	7	4.4
American Robin	8.5	11	7.6	5	8.2	6	3.9
Song Sparrow	19.1	29	2.8	2	4.0	4	3.8
Cedar Waxwing	12.9	8	4.2	7	4.2	9	3.2
American Bittern	11.3	2	4.5	3	4.7	4	3.1
ALDER FLYCATCHER	13.4	14	4.7	6	2.4	3	3.1
Common Grackle	8.8	7	5.1	3	5.4	5	3.0
BLACK-THROATED GREEN WARBLER	8.8	14	5.7	2	4.8	3	3.0
Golden-crowned Kinglet	11.9	11	4.4	6	2.7	1	2.9
Black-capped Chickadee	7.3	11	5.2	8	4.0	5	2.6
EASTERN WOOD-PEWEE	8.9	12	4.1	4	3.6	2	2.6
Red-breasted Nuthatch	8.1	15	4.5	4	3.4	3	2.5
Ruffed Grouse	5.3	0	4.8	1	4.1	2	2.3
Pine Warbler	6.1	6	4.3	5	2.0	1	1.9
Brown-headed Cowbird	2.8	1	3.3	5	4.2	1	1.7
GREAT-CRESTED FLYCATCHER	4.0	4	3.1	2	3.3	3	1.7
BLACK TERN	4.1	0	4.5	0	1.1	1	1.5

Neotropical Migrants:

Total Species	47	26	44	19	48	25	
Total Individuals	259.3	307	106.5	87	100.3	92	71.5

All Birds:

Total Species	113	72	103	61	105	67	
Total Individuals	738.6	748	291.8	234	279.3	226	200.00

^aBBS data = all birds heard or seen during one run of a 50-stop route (stops 0.5 mile apart, 3-minute count period at each stop); data for each transect of the Hiawatha survey = all birds heard or seen per run of a 12-stop route (stops 1 mile apart, 10-minute count period per stop). The Hiawatha Survey had two runs per route in each year except 1996, when only one run on each route was performed. To make data comparable, the 8-year means are calculated per run per route for each year. Only species with an importance value >1.5 (maximum=200) are listed.

^bImportance value = sum of the relative abundance values for a species in each survey (BBS and Hiawatha), where relative abundance = percent of total individuals (all species) accounted for by the species indicated.

^cCanada geese were not counted on the Hiawatha Survey in 1993. Means do not include that year.

APPENDIX 4: BIRD LIST OF SENEY NATIONAL WILDLIFE REFUGE

The following table lists those species encountered in burned-over habitats at Seney NWR during the 4-year period after the 1976 fire (1977-1980) by common name, occurrence, and habitat (Anderson 1982). Occurrence codes are: VC – very common; C – common; O – occasional; R – rare; U – uncommon. Habitat codes are: MF – mixed forest; C – coniferous forest; B – bog, grassland.

Species	Occurrence	Habitat
Broad-winged hawk	U	MF, B
Spruce grouse	U	C
Ruffed grouse	C	MF, B
Sharp-tailed grouse	U	B
Sandhill crane	C	B
Killdeer	VC	B
American woodcock	VC	MF
Common snipe	C	MF, B
Black-billed cuckoo	U	MF
Ruby-throated hummingbird	C	MF
Common flicker	U	MF
Yellow-bellied sapsucker	C	MF
Hairy woodpecker	C	MF
Black-backed woodpecker	R	MF, C
Eastern kingbird	VC	MF, B
Great-crested flycatcher	O	MF
Alder flycatcher	C	MF
Least flycatcher	C	MF
Eastern wood pewee	C	MF, C
Tree swallow	R	MF
Blue jay	C	MF
Common crow	C	MF, C
Black-capped chickadee	C	MF, C
Boreal chickadee	R	C
Red-breasted nuthatch	U	C
Brown creeper	C	MF, C
Winter wren	U	C
Sedge wren	U	MF, B
Brown thrasher	U	MF
American robin	C	MF
Hermit thrush	C	MF, C
Veery	C	MF, C
Golden-crowned kinglet	C	C
Ruby-crowned kinglet	U	MF, C
Cedar waxwing	C	MF
Starling	R	MF
Solitary vireo	U	MF, C
Red-eyed vireo	R	MF
Black-and-white warbler	C	MF
Golden-winged warbler	R	MF

Nashville warbler	R	MF, C
Magnolia warbler	C	C
Cape May warbler	C	C
Yellow-rumped warbler	R	MF
Black-throated green warbler	C	MF, C
Blackburnian warbler	U	C
Chestnut-sided warbler	C	MF
Pine warbler	C	C
Ovenbird	C	MF
Common yellowthroat	C	MF
Mourning warbler	R	MF
Canada warbler	C	MF
American redstart	C	MF
Bobolink	O	B
Red-winged blackbird	O	B
Brewer's blackbird	U	MF
Common grackle	O	MF
Brown-headed cowbird	R	MF
Northern oriole	C	MF
Scarlet tanager	O	MF
Rose-breasted grosbeak	C	MF, C
Indigo bunting	O	MF
Evening grosbeak	O	MF, C
Purple finch	C	MF, C
American goldfinch	O	MF, B
Savannah sparrow	C	MF, B
LeConte's sparrow	R	B
Vesper sparrow	C	B
Dark-eyed junco	C	MF, B
Chipping sparrow	VC	MF, B
White-throated sparrow	VC	MF, B
Lincoln's sparrow	O	B
Swamp sparrow	O	B
Song sparrow	C	MF, B

APPENDIX 5: FWS CONSERVATION PRIORITIES IMPACT MATRIX

	Alternative A (No Action)	Alternative B	Alternative C (Proposed Action)
Endangered Species (1)			
Gray Wolf	-	+	+
Bald Eagle	0	0	0
Lynx	-	+	+
Beaver Ponds (2)			
American Bittern	-	+	+
Wood Duck	-	+	+
American Black Duck	-	+	+
Mallard	-	+	+
Blue-winged Teal	-	+	+
Sedge Marshes (3)			
Northern Harrier	-	+	+
Yellow Rail	--	++	++
Sedge Wren	--	+	+
LeConte's Sparrow	--	+	+
Bobolink	--	+	+
Mixed Forest/Coniferous (4)			
American Woodcock	0	0	0
Northern Goshawk	-	+	+
Wood Thrush	0	0	0
Golden-winged Warbler	0	0	0
Cape May Warbler	0	0	0
Connecticut Warbler	0	0	0
Black-billed Cuckoo	0	0	0
Whip-poor-will	-	+	+
Northern Flicker	-	+	+
Olive-sided Flycatcher	-	+	+
Rusty Blackbird	0	0	0

- ++ significant positive impact (1) Improved habitat for prey species.
 + minor positive impact (2) Increase in beaver ponds and brood nesting conditions from aspen regeneration.
 0 no effect
 -- significant negative impact (3) Improved nesting and feeding conditions in open to semi-open sedge marshes.
 - minor negative impact
 (4) Enhanced habitats for species that benefit from more open understory conditions.